July 1989 Vol. 2 Nº 10 Price £1.80

Archive

The Subscription Magazine for Archimedes Users

Sprite Plotting for Games

Prolog System X

MS-DOS Column Reappears!

RISC-OS WIMPs / A3000 Interfacing

BASIC V version 1.04 Changes

Reviews: Home Accounts, Archway WIMP Tools, Realtime Solids Modeller, Plague Planet, Studio 24 Plus, Computerware Hard Disks (again).

"I will NOT buy RISC-OS!"

I wonder if this is how you are feeling at the moment? Acorn are trying to force you to buy RISC-OS by setting a deadline (which has now, technically, passed) for the low-price offer. All the magazines, including this one, are publishing article after article which assume that you have got the new operating system. (This present issue is no exception!) You feel cheated and pressurised. Why go to the new system when the old one works perfectly well and you may find that half your existing software doesn't work properly under RISC-OS?

Well, as those who have used RISC-OS will tell you, it **IS** worth the change. Once you get used to it, the new system is easier to use than Arthur. From the software writers' point of view, RISC-OS offers a lot more possibilities for writing applications that were just not possible under Arthur. (DTP is the most obvious example.) You will find that more and more of the software being published will be RISC-OS only. I'm sorry about that, but it's inevitable, I'm afraid.

The decision of the Archive team is that we should be fully committed to RISC-OS. Therefore, if you feel that Archive is no longer value for money because a large percentage of it is irrelevant to you, we are quite prepared to cancel your subscription and refund you on a pro rata basis for the magazines outstanding, though obviously we would be sad to lose you.

If you decide to stay with the majority, I suggest that you send in your £36 fairly rapidly – before the price goes up to £70 which it should do, officially, from 1st July. We have been able to buy in some RISC-OS at the old price so, until those stocks run out, we will be able to maintain the lower price.

The Compiler War continues...

Brian Cowan's review of RiscBASIC (and his initial comparisons with ABC) attracted a certain amount of criticism from certain quarters. A letter to Archive from Paul Fellows appears on page 39 of this issue and, while Brian accepts certain of the criticisms, he does want space to do a deeper and more searching comparison of the two compilers which time and space have denied him for this issue. (He was also hoping to combine it with a comparison of the Mach Technology compiler but it's not quite ready, as yet, to be tested by a reviewer.)

Archive T-Shirts?

One reader reckoned that it would be good to have Archive T-shirts! I can't say it's quite 'my scene', but let us know if you are interested and we'll look at the cost of getting one designed.

August may be a little late this year!

I hope you will bear with us if the August issue is a little late this year. We are trying to fit in a week's holiday at the end of July, so please be patient with us. Thanks!

A Big Thank You!

Careware Disc Nº1 is selling well and so, with the revenue from that and from selling library cases (all gone now, I'm afraid) and direct donations and also from second hand software donated and sold, we have so far raised £344, and there is another Careware Disc in preparation. So, a big Thank You to all who have helped. Keep up the good work!

Best wishes! Paul Beverley

Archive

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Products Available

• **RISC-OS price rise!!** – We do now, at last, have RISC-OS in stock. Indeed, we can get as many as we want so you can send in your orders. However, please note that the price is due to increase at the end of June to £69 + VAT (£70 through Archive). Yes, I know that, by the time you read this, the deadline will be past, but we have bought in some stocks at the old price (£36). As they have gone, however, the price will have to go up to £70.

• **A305 RAM Upgrades down in price** – The price of 1/2 Mbyte RAM upgrades for the A305 has come down from £159 to £130. The reason for this is to clear the existing stocks that I have got. Because it was impossible to buy them for months, I assumed there would be lots of people waiting to buy them so, to get a better price, I bought lots of them. Now I can't get rid of them! So to avoid cash-flow problems I'm having to sell them off at a loss. We'll even fit them f.o.c. if you can call in to the office!

• **A410's, A420's or A440's anyone?** – I have now managed to get hold of some A410's (I think the supply must be improving!) but no A420's and A440/1's are even further off. However, I do have 20M and 40M upgrade drives for the A410 and upgrade RAM in stock (which has now gone down in price, see below!), so I can make up various configurations for you, at the following VAT and UK carriage inclusive prices: (and each comes with a voucher for £100 worth of free software)

A410 + 2M + 20M drive (i.e. an A420)	£1780
A410 + 4M + 20M drive	£2160
A410 + 2M + 40M drive	£1980
A410 + 4M + 40M drive (i.e. an A440)	£2360

Add £60 for the M version (i.e. with the PC emulator) and/or £230 for an Acorn colour monitor. If you want to include a multisync monitor (Eizo 9060S or N.E.C. 3D), add £535 to the prices above.

• **A410/420 RAM Upgrades down in price** – The price of 1 Mbyte RAM upgrades for the A410/20 has come down from £205 to £185.

• **ArcComm** – New comms software from BBC Enterprises. £29.95 (or £28 through Archive) offers videotext and scrolling terminals with Hayes, DTI or manual modems. (RISC-OS only).

• **Atelier** – the Minerva art package (£85 through Archive) is now available. It will allow you to create 256-colour graphics and claims 370 effects, including 60 shades of black and white, rotate and distort, texture mapping, air brush simulation and the ability to create perspective, light and shade.

• **Careware Nº 1** – Since my comments in last month's magazine we have received enough good software to set up Careware Nº1. It contains: Othello game, LabelPrinter, "Make" utility, Calendar, Headstand module (= turn the screen upside down!), Sliding Block puzzles, 'Simon' game, plus lots of simple games programs and graphics demos, e.g. Biorhythms etc. The cost is £6 so that £3 is divided between the three charities mentioned on page 7 last month.

Stop Press: Matthew reckons he will have **Careware Nº2** ready by the time you read this and also **Shareware Nº12** and also a RISC-OS update disc which we will do as **Shareware Nº13.** This will contain programs that have been on previous Shareware or program discs but which have been updated (and, in some cases, improved) to run under RISC-OS. If these are ready in time, I'll put information on the back of the Price List.

• **DTP from Acorn is here!** (Well, in limited quantity, anyway – sounds a familiar story.) At last, a full function DTP taking text and graphics from various sources and outputting the resulting document to a range of printers from cheap 9-pin DM printers to high-performance laser printers. The price is £149 + VAT (£145 through Archive).

• **Euclid update** – A RISC-OS version of Euclid 3-D modelling and animation system is now available for just £70 inc VAT (or £60 through Archive.) Registered Euclid users can upgrade through Ace Computing for £25. Euclid "attachments" available include Mogul (£20) which allows the production of films of moving objects, Projector (free) – a PD projector for Mogul films and Splice (£30) – a full function version of the Projector program allowing single frame editing, film splicing, sound tracks etc.

• **First Fonts (Maths/Scientific)** is now available for 9-pin printers and also for the H.P. LaserJet and

DeskJet. There's no need to specify the printer because the different drivers are all in the one package, still at £19 +VAT (£20 through Archive).

• **Hard Drives now Exportable** – Computerware have now found a supply of hard drives on which there are no re-export restrictions, so we can supply complete hard drive systems to any part of the world. The costs for overseas customers of buying podules only, was given in the April issue, page 2. If you want to buy a complete drive system, take the prices on the current price list, divide by 1.15 to subtract VAT. Then European customers should add £20 for carriage and those further afield should write or ring for a quotation for the cost of carriage.

• **MewSoft programs** are now fully RISC-OS compatible – Faxfile Manager for the owner of a personal organiser, Forms Manager combining large size and standard text with lines boxes and grids, standard and sideways A4 and Fancy Labeller which gives (8) fancy fonts and (20) fancy frames. Each program is £27.90 inc p&p.

• **Micro-Librarian 'Professional'** (version 3.0) £300 from Micro-Librarian Systems is a suite of over 30 integrated programs which can easily be transferred to hard disc. A training/demo disc with sample catalogue and readership is available for £5.

• **Modems down in price!** – The prices of the two 2400 baud modems that we sell through Archive have been reduced thanks to two eagle-eyed readers who found better sources for us. The Miracle WS3000 is down by £40 to £350 and the Amstrad SM2400 is down by £30 to £235.

• **Monthly program discs** – "What's on the program discs" is a question I get asked fairly frequently, so here is a summary of the story so far:

Volume One

1–6: Arthur 1.2 desktop accessories, findfile, *commands and structured directory listing.
7: RS423 patch (v1.24), FastRM updates, Mandelbrot screens, Life update
8: Tunes for the Music Editor
9: Phone number database
10: FWP printer drivers (Canons + Kaga), Mode conversion programs, Mandelbrot program
11: Desktop accessories, more FWP printer drivers (Citizen & Kaga Taxan 120), Partial renumber program, Beebug's PD 'Arc' compression program, hard-disc boot program, more screen shots
12: Another FWP printer driver (Star Gemini 10xi), Alerion & GammaPlot screen shots, Hard Disc backup program, 'The Gig' animation demo

Volume Two

1: Freddy's Folly, Leonardo, & Orion screenshots
2: Speeding up the ARM, FWP printer driver generator program, a new window system?, Fractal landscape screen shots
3: FWP IBM fonts
4: FWP printer driver (HP-DeskJet), Musical Mandelbrots, Quazar screen shots
5: ArcTerm v3.09, Serial Fix v1.24, Logistix examples, Mandelbrot Sprites
6: FWP & Pipedream titbits, more compression programs, Artisan example screen shots, fade routines
7: Repton utility, screen loading programs, FWP fonts (NEC) and font designer
8: More tunes, Hard disc backup update
9: RISC-OS disc copier, RISC-OS window demo, new BASIC error messages, full list of Repton passwords, BASIC timing program.

The other question I get is, "Is there a program disc subscription? Or one for the Shareware/Careware discs for that matter?" The answer is basically that at £3 each, (unchanged since Archive started nearly two years ago) we cannot really discount them. What we can do is to accept pre-payment for discs. As long as you state **clearly** what you want, we can just prepare some pre-printed address labels and will send you a reminder when we send out your last pre-paid disc.

• **News for NewsMaster users!** – For those people using NewsMaster, the desktop publishing package that runs under the PC Emulator, MGA Microsystems are selling some additional Art Galleries. They also have a graphics editor and a whole load of other goodies. They have a comprehensive catalogue available on request.

• **RISC-OS Companion** – Software Solutions have launched a set of RISC-OS utilities disc, which enhance the facilities offered by the desktop. The utilities adhere to the RISC-OS user interface guidelines and so provide consistency between applications. The disc includes utilities such as a

terminal emulator, changing filetypes, a note pad, the bin (as on the Apple Mac), additional star commands, file conversion programs for View, Wordwise, First Word Plus and !Edit. The disc costs £49.95 + VAT (site licences are available).

• **SPARK** – David Pilling, who originally wrote the Beebug file compressor utility called ARC, has now extended and improved it. It now works under RISC-OS and is very simple to use – just drag the file in question onto the SPARK icon on desktop iconbar. The disc costs £5.99 and is available direct from David Pilling.

• **Z88's down in price** – Cambridge Micros have dropped the price of the Z88 computer so we can now offer it for just £240 instead of £280. (When comparing prices, remember that our price includes VAT and carriage.)

• **Review Software Received...** Apart from reviews already written. we have received review copies of the following software: •Structural Analysis from VisionSix (needs a qualified engineer to review it), •EpBAS(*) from Abacus Training – Extended precision from BASIC, •Geoscan – an educational database and program on world development and •Faxfile, •Forms Manager, and •Fancy Labeller from MewSoft (see above).

*(*I think I may have already sent an older version of this to someone but if I have, I can't remember who! – If I have, there's an updated version for you and, if not, someone else can have a go!)* A

Forthcoming Products

• **A3000** – Acorn's new machine will be on sale for the first time at the 1989 BBC Acorn User show. The doors will open at Alexandra Place on 21st July, visitors will be offered instant 0% finance and a special carry-away service. To take advantage of this offer, you must first sign up with any exhibitor displaying the machine. Once this is done, you will be able to pick up your A3000 from a giant pantechnicon lorry which will be parked outside. The 0% finance option (underwritten by Acorn) can be obtained from Mercantile Credit, who will be at the show. *(Norwich Computer Services will be at the Show, stand 93A, but we will not be involved in 0% finance selling. Ed.)*

• **A3000 products** – PRES are launching several new products to compliment the A3000, some of which will appear at the 1989 BBC Acorn User Show. One of the products is a plinth (costing around £20 – £30), which has been produced because the design of the new machine does not allow a monitor to rest on top of it. If desk space is tight, the machine can be stored under the plinth and slides out only when needed. You can also buy a plinth which can contain a Winchester hard drive and one or two floppy disc drives (either two 3.5 inch drives or one 3.5 inch drive and one 5.25 inch drive). PRES have also turned their attentions to A3000 expansion cards – they have designed a case for the external expansion port so that Archimedes cards can be used without any alterations. In addition, the company is in the process of producing an extra board which will allow up to four extension cards (mini podules) to be fitted.

• **Adventure games** – Topologika will be launching compilations of adventure games for the Archimedes. The games were originally written on the BBC for Acornsoft and are being expanded and re-released in 'native' Archimedes code. Two compilations will be available at the BBC Acorn User Show. The first contains "Countdown to Doom", "Return to Doom" and "Philosopher's Quest" at £19.95; and the second contains "Kingdom of Hamil" and "Acheton" also at £19.95. Topologika will also be launching a brand new title at the show. It is based on the plays of William Shakespeare and it is claimed that you don't have to be an expert to play it. The game is called "AVON" and will sell at £19.95.

• **ARM-Tracker** – 8-channel sound sequencer from The Serial Port for producing music suitable for insertion into games and demos, or just for your own listening. Mouse-driven front end includes VU meters, spectrum analyser, pattern display and timecounter.

• **Dabs Press** are bringing out 3 new products...

• **ABC65** is an Archimedes-to-6502 cross compiler, running on the Archimedes. It will convert programs written in BBC BASIC V into stand alone 6502 machine code that can be run on any BBC

Microcomputer. It will sell at £69.95 inc VAT and includes 2 discs and a 150-page user guide.

• **ABC Dynamic Extensions**, priced at £49.95 inc VAT, provides utilities which extends Dabs Press' Archimedes BASIC Compiler. It comes with a user guide and includes three programs: Library Maker, Cross Referencer and Profiler.

• **Instigator** provides extension to the Archimedes operating system. It is a module which contains over 80 star commands which extend and simplify existing features of both Arthur 1.2 and RISC-OS. The main features are: single command windows, command archiving, a file finder, colour palette utilities, a file compressor, a comprehensive line editor, an internal clipboard, memory manipulation facilities and a screen dumper. It is supplied with a 120 page user guide and will cost £49.95 inc VAT.

• **Disc copier** (as yet un-named) from The Serial Port – "The most powerful bit copier available for the Archimedes". It is claimed to be able to copy almost any Archimedes/PC/ST discs.

• **DTP from AVP** – The new multi-tasking RISC-OS version of Pixel Perfect from AVP will be on demonstration at the Acorn User Show. It is "the only DTP package for the Archimedes written specifically with the school user in mind."

• **DTP from Beebug** – Joining the DTP race are Beebug, whose new package is to be on demonstration at the Acorn User Show.

• **External Expansion Boxes** – SGB Computer Services will be producing external expansion boxes with PSU, linked to the Archimedes via a buffer card. They hope to offer a 10 watt version, supporting either 3 single or 3 double podules and a 25 watt version, supporting up to 5 single width podules or 3 double width podules. This will allow the A300 and A400 series to have 4 to 8 slot and the A3000 2 (1 mini, 1 standard size) to 6 slots. They are planned for release in early August.

• **Graphics Tablet** from Watford Electronics – launch price £259 including tablet, leads and software which allows mouse-based applications to be run from the tablet. The pointer is moved over the 12" x 12" tablet via a four button puck with transparent lens with cross hairs. Three buttons emulate the normal mouse buttons and the fourth is used for special effects.

• **Holed Out** – More courses are being made available for Holed Out – harder than the existing courses. Impact are going to be releasing two packages, each with two courses, but each will be a complete Holed Out package in itself and they will only cost £16.95 (£16 through Archive) instead of £18.95 which is what the original Holed Out costs.

• **Mach Technology Update** – Further to the comments in last month's magazine, the latest word from Mach Technology (22nd June) is that nothing is actually ready for shipping yet, but many of the products are "nearly ready to go out".

• **Pipedream3** from Colton Software(£169.05) is due to be launched at the Acorn User Show. This is a fully RISC-OS version and includes lots of extra features: •many documents loaded at once (to one copy of PipeDream), each in separate window •slot protection •natural recalculation with optimised minimal recalculation •external references between several loaded files for 3-D modelling •iteration •optional splitting/joining of line on carriage return, delete •inclusion, display and printing of pictures generated by other applications •Z88 filing system provided to load and save files directly to Z88 via serial port. (This requires the PC LINK II EPROM fitted to the Z88 and a Z88-Archimedes leadand it also requires serial port upgrade if used with Archimedes A3000) •Built-in Spelling Checker (93,000 words) •Multi-tasking User Interface •Files loaded by double-clicking PipeDream icons in directory viewer or dragging file to PipeDream icon •Drag files to/from other windows, including Edit, Acorn DTP •Automatic context-sensitive dynamic help system •extra "thousands" display format, i.e. 1,234,567.89 instead of 1234567.89 •extra spreadsheet functions: atn2, rand, round, monthdays, dcounta.

• **Presenter II** – an upgraded version of Lingenuity's Presenter will be available at the BBC Acorn User Show. It works under RISC-OS and includes greater choice of chart options, 3D pie charts and a larger data area. It will retail at £39.95 + VAT and existing owners of Presenter can obtain an upgrade for £14.95.

• **Presenter Story** has been designed to cater for most professional presentation requirements. It was developed by X-AMPLE Technology in Holland

and will be distributed by Lingenuity at the BBC Acorn User Show. It includes features such as a logo editor, business graphics, charts, histograms, anti-aliased fonts with various styles and a variety of screen scrolling features. It is claimed that screens can be prepared quickly and altered easily to allow for last minute changes. It supports a screen resolution of 640 x 256 pixels in 16 colours (i.e. mode 12) and will retail at £199.95 + VAT.

• **RISC-OS P.R.M.** – Rumour has it that the new RISC-OS PRM will be available late in the 3rd quarter. It is expected to consist of four volumes, totalling 1400 pages.

• **Scanner** – a hand-held scanner for £149 from Watford Electronics – up to 400 d.p.i., 4" wide. RISC-OS software allows cropping and scaling to any size including stretching in X and Y directions separately, colour tinting, X and Y flip, edge detection which turns solid objects into outlines, selective directional copying allowing features like lines or text to be made thicker or thinner.

• **Scanner** – a hand-held scanner for "under £200 inc VAT" from Beebug is to be on demonstration at the Acorn User Show.

• **SCSI Interface and Real Time Digitiser** – Lindis International (alias Lingenuity) are planning to produce a hard disc drive interface (approx. price £199.95 + VAT) and a real time digitiser which allows for frame grabbing (approx. £699.95) A

Science Frontiers hardware...

Archimedes WINCHESTER Hard Disk Upgrades

* Fujitsu 40 Mb (formatted) Fast Hard Disks
* ACORN Hard Disk Controller Podule

Upgrade kits for all Archimedes: 310, 310HD, 410, 420 and 440

310	410	310HD, 420, 440
Fujitsu Hard Disk Acorn HD Podule all Cables and Metalwork	Fujitsu Hard Disk Cables and Metalwork (Controller in machine)	Fujitsu Hard Disk only (Replacement drive to give increased storage)
...£540.00	...£379.00	...£365.00

Fujitsu are Japan's number one manufacturer of reliable high-performance disk drives.

Hard disks are 3.5" 35 ms, 625KB/s internal fitting and are completely Acorn RISC-OS compatible. Drives will be formatted and soak-tested on request.

Larger drives are also available. Please call for individual system requirements or for further details.

Order from:

GES Computer Supplies
Granitehill Enterprise Centre
Granitehill Road
Northfield
Aberdeen AB2 7AX

Tel: 0224–698545

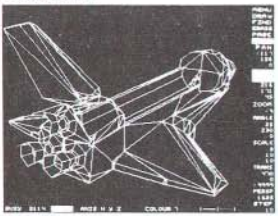
All prices include P&P but exclude VAT.

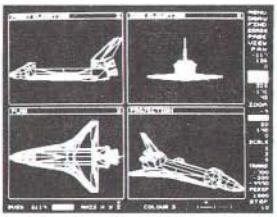
G.E.S. Computer Supplies: Official Acorn Dealer

SILICON VISION

SOFTWARE FOR THE ARCHIMEDES & BBC

SolidCAD





The ultimate 3D Draughting System for Architectural design, Interior design, Engineering Design and Teaching CDT. Allows drawing in plan, front & side elevations and also directly in 3D view. Includes powerful zoom & pan options for precision draughting and surface definition for creating solid colour objects. Also includes Sweep, Extrude & Macro facilities for designing very complex objects easily. Designs created with SolidCAD are compatible with the Realtime Graphics Language for high-speed flicker-free animation. The custom Archimedes version also performs smooth shading for realism. SolidCAD(Arc) users can upgrade to the Realtime Solids Modeller (Arc) for £40.00.

£49.95 (ARC or BBC B/B+/Master),

REALTIME SOLIDS MODELLER

The package includes both the sophisticated design environment of SolidCAD and the high speed animation capability of a Realtime Graphics Language (RGL) module developed in pure ARM Risc code for supercharged performance. The package is ideal for Architectural design, Interior design, Engineering design & teaching CDT. The RGL module can be used to create standalone flicker-free animation of designs from your own programs. Smooth shading is also performed for realistic images. Through our in-house expertise in 3D Design and High-speed techniques, no other package can rival the design environment & animation speed of the Realtime Solids Modeller.

£89.95 (ARC)

REALTIME GRAPHICS LANGUAGE

The Realtime Graphics Language rom provides a complete 3D Solids/Wireframe animation system with 52 star commands and 3D Editors for designing objects to animate from your own programs. Includes a 35,000 pixels/sec line generator for fast 3D drawing rates. 3D Rotate, Scale, Orbit, Perspective and Turtlegraphics. Also compatible with designs created with SolidCAD (BBC).

£49.95 (BBC B/B+/Master)

SUPER-DUMP

The ultimate printer driver which takes advantage of the highest resolution capability of ordinary Epson compatible printers to provide 1920 × 1024 resolution. Images can also be scaled, positioned and previewed before printing. Fully compatible with SolidCAD, Realtime Graphics Language, Gate-Array design system & 3D CAD/Animation system. Your own graphics programs or other CAD packages can be made compatible with Super-Dump by the addition of a few simple commands. An example program is included in the package.

£15.95 (BBC B/B+/Master), £24.95 (ARC)

Presentation System

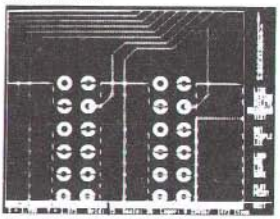
The package provides an interactive environment to create, edit and play-back computer controlled presentations for lectures and demonstrations. Also handles graph plotting for polynomials & user-defined functions which can be incorporated within the presentations.

£34.95 (BBC B/B+/Master), £49.95 (ARC)

All Archimedes software run in native mode on A305 – A440 & A3000 with Arthur 1.2 or RISC OS

SILICON VISION LTD, SIGNAL HOUSE, LYON ROAD, HARROW MIDDLESEX HA1 2AG. TEL: 01-422 2274 or 01-861 2173
FAX: 01-427 5169. TELEX: 918266 SIGNAL G.
(Access/Mastercard/Eurocard accepted)
All prices include VAT and Carriage (Overseas orders add £4).

ARC-PCB



The ultimate PCB design system developed specifically for the Archimedes with a specification that cannot be matched. Includes Automatic routing, Rats-nesting, 8 layers, Surface mount capability, 0.001" resolution, 32" × 32" maximum board size, On-line Help, Fast Zoom/Pan/Redraw, Text & Silkscreen facility, Variable Line/Pad/Text/Grid sizes, Part Libraries, Block Move/Copy/Rotate/Mirror/Erase options, and up to 300,000 components.

For hardcopy, the system supports the industry standard HP-GL, GRAPHTEC PLOTMATE plotters and printers at their highest resolutions. Also provides automatic drilling information with extensive support from PCB manufacturers for final layout and production. optional 1 year telephone Hotline support (£100) and software maintenance service (£75) is also available.

£195.00 (ARC)

Risc BASIC

The first true BASIC V syntax compiler which will convert your programs into supercharged Risc code for turbo performance leaving the competition standing. Features include Relocatable modules, full cross references, Double precision floating point & Integer support in-line assembly, Window-based or command line compilation environment standalone code generator, object code optimiser, full array manipulation and dimensions support, multiple exit structures & full runtime error handler.

£99.95 (ARC)

RiscFORTH

A new 32-bit implementation of the FORTH-83 standard, designed to take full advantage of the ARM architecture. Features include Multi-tasking, Optimising compiler, built-in ARM assembler with floating point mnemonics, built-in Full screen Editor, File system interface, OS calls support, Floating point & Integer maths, WIMP support, Single-step debugger, Shadow screen for documentation, Block manipulation, Dictionary & Vocabulary display, Call finding and a standalone code generator.

£99.95 (ARC)

BBC Acorn User Show

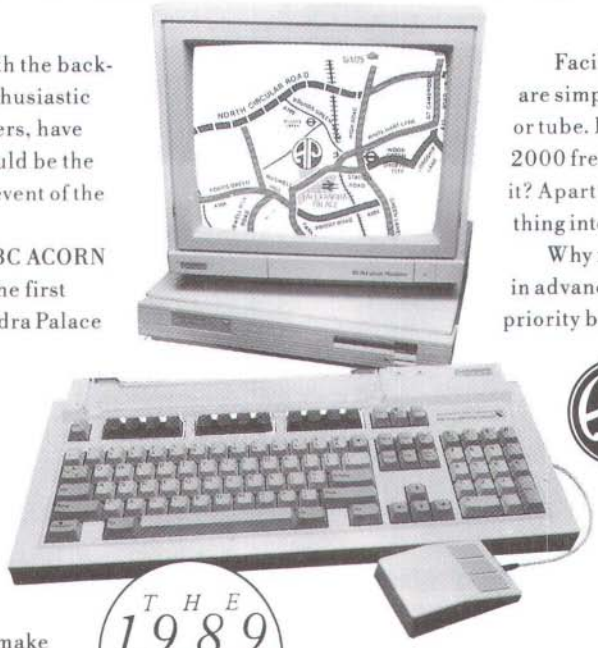
BBC ACORN USER, with the backing of the BBC and the enthusiastic support of Acorn Computers, have together planned what could be the most exciting computing event of the year.

The new, all-action BBC ACORN USER SHOW is back, at the first home of BBC TV – Alexandra Palace featuring:-

- new product launches
- new software
- massive computing exhibition
- informative seminars
- technical clinics
- workshops
- demonstrations

All this and more will make the new BBC ACORN USER SHOW a real must for everyone interested in computers and their applications.

There are daily competitions, free draws with fabulous prizes to be won and celebrity guest appearances.



THE 1989 BBC ACORN USER show

Facilities at the tastefully restored Alexandra Palace are simply superb and it's so easy to get to by road, rail or tube. If you're driving you'll be glad to know there are 2000 free car parking spaces. So why not make a day of it? Apart from the beautiful grounds you'll find something interesting and exciting around every corner.

Why not save time and money by booking your ticket in advance? Cut the coupon now and ensure your priority booking.

ALEXANDRA PALACE · LONDON
Friday July 21st 3pm-9pm
Saturday July 22nd 10am-6pm
Sunday July 23rd 10am-6pm

BOOK NOW AND SAVE

Advance Tickets: Adults £2.50 Under 16s £1.50

At the door: Adults £3.50 Under 16s £2.50

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Hints & Tips

• **Partitioning hard drives** – It is possible to partition hard drives with less than 10 Mbyte. The answer is in the REM statements in the Harddisc program on the PC disc. Change the A2080 in line 610 to any multiple of &8800 (in hex). Details are given in the REMs.

• **Hearsay** – We mentioned changing modem baud rates in H & T in May. Philip Green sends us a way of doing this automatically suggested by Alfons Tjin. Use a dial prefix in the modem driver edit screen of just "AT" and then put B3D or B0D, as necessary, in front of the phone number in the telephone directory.

• **Case sensitive system variables** – Some readers have had problems using the *SETMACRO Alias$ command. This is because system variables are case sensitive i.e. you need to type: Alias$ not ALIAS$

• **Overload passwords:** A B BROS, CABBAGED, SLIPPERS, PREVIOUS, PILLAGED, BOVERBOD, LAVATORY, CASSETTE, WHALE FM, EXTRACTS, STOPKETS

The following hints were sent in by Lorcan Mongey

• **'T' Option in LDR and STR** – Assembly language programmers may have noticed that the Programmer's Reference Manual mentions a 'T' option in the description of the LDR and STR commands (page 608), but neglects to say what it does. It is, in fact, used for setting the write-back option and has exactly the same effect as '!'. Note that the *MEMORYI disassembler always disassembles pre-indexed write-back with '!' and post-indexed write-back with 'T', although you may use either form when assembling. Bear in mind that post-indexed write-back always takes place, regardless of the state of the write-back flag.

• **Bit patterns for LDR and STR** – There is an omission in Appendix C of the "ARM Assembly Language programming" book published by Computer Concepts. Appendix C gives the bit patterns of the ARM instruction set, but does not describe the 'L' bit of the 'Single Data transfer' instruction. This is the Load/Store bit: 0=store (STR), 1=load (LDR).

This description also applies to the 'Block data transfer' instructions (STM and LDM).

• **BASIC restrictions** – In BASIC II on the BBC B (and IV on the Master) there were a number of restrictions which no longer apply to BASIC V on the Archimedes, but have not been specifically mentioned in the Archimedes User Guide. They are worth noting because they have probably become ingrained in BBC B users who may not have realised that they have been lifted.

1) You can now change MODE inside a procedure or function. This is because the screen RAM is now completely separate from the program area.

2) The nesting limits of FOR, REPEAT and GOSUB (10, 20 and 26 respectively) no longer apply. Instead of a fixed limit, you can now nest loops until you run out of RAM. I have successfully nested loops 15,000 deep and run a recursive procedure 30,000 levels deep! Strangely, nesting GOSUBs too deeply is not trapped and will corrupt your program, but this situation is unlikely to happen in practice.

• **BASIC errors** – I have found four BASIC errors not listed in the User Guide (Issue 2). They are:

11 No room for this dimension – An attempt was made to dimension an array for which there was insufficient space.

25 Bad MODE – An attempt was made to select a screen mode for which there is insufficient memory. More memory can be allocated by *CONFIGURE SCREENSIZE.

37 No room for function/procedure call – An attempt was made to 'nest' too many function and/or procedure calls.

44 Too many nested structures – An attempt was made to 'nest' too many FOR...NEXT, REPEAT...UNTIL and/or WHILE... ENDWHILE loops.

Note that 11 and 44 are covered in the Archimedes 400 series BBC BASIC Guide.

• **Using FORTRAN 77** – The article on using FORTRAN 77 in Archive 1.7 included a sample subroutine showing how to access graphics from FORTRAN. There are a number of problems with this subroutine. It can't cope with negative graphics

coordinates (needed after an origin shift), it sends a line feed to the screen when it is used, which can cause your graphics to scroll upwards, and it uses an output channel which should be kept free for file access. The following solves all the problems:

```
SUBROUTINE PLOT(K,X,Y)
INTEGER X,Y   I1=IAND(X,?IFF)
I2=ISHFT(IAND(X,?IFF00),-8)
J1=IAND(Y,?IFF)
J2=ISHFT(IAND(Y,?IFF00),-8)
PRINT 100,CHAR(25),CHAR(K),CHAR(I1),
        CHAR(I2),CHAR(J1),CHAR(J2)
RETURN
100 FORMAT (6A1$)
END
```

This method masks out the unwanted bits and shifts the data into the l.s.b., thus preserving the sign. It uses PRINT instead of WRITE, avoiding the need for a channel number. The $ at the end of the FORMAT statement suppresses the line feed. (No criticism of the original authors is intended; my first attempt looked very similar!)

Included on this month's program disc is Graph_FOR, the FORTRAN source of a set of graphics subroutines which provide a full set of VDU calls. Some, like BELL for instance, are trivial, but others are more complicated.

• **Printer conventions** – Many people seem to have difficulty with setting up the correct linefeed or non-linefeed for their printers for different applications, so I.J. King has tried to explain it for us...

How the Archimedes deals with varying printer standards – Since there are two standards for printers, the Archimedes has a mechanism to allow it to cope with both. The standards in question affect the way the paper is fed through the mechanism and there are two possible cases:

A. Auto Linefeed: every time the printer receives a carriage return character (code 13), it generates a line feed (code 10) to move the paper up a line.

B. Non-Auto Linefeed: the printer does **not** generate its own linefeed characters but relies on the computer to send a linefeed after every carriage return.

Most modern printers will actually have a switch to select either of these modes, allowing them to be compatible with most computers, but this is likely to be difficult to reach. The Archimedes will (in the case of virtually all software) send a line feed after every carriage return. To allow compatibility with printers in mode (A) above, it is possible to tell the machine to ignore a particular code when sent to the printer. By setting this to 10 (the code for line feed), no line feeds will be sent to the printer and you are compatible with type (A) printers.

This code is set up using the *IGNORE command, for example:

```
*IGNORE 10
```

To disable the trap altogether, simply enter *IGNORE on its own. Either of these may be preceded by CONFIGURE to make the effect permanent, e.g.

```
*CONFIGURE IGNORE 10
```

The Archimedes is set up with a factory default ignore code of 10, making the system compatible with type (A) printers when it arrives.

Problems arising when the protocol is ignored – The above should make everything seem fairly simple and indeed it ought to be. However, some software houses, notably GST and Grafox (i.e. First Word Plus and Logistix) have chosen to ignore the sensible protocols described above and override the *IGNORE status in such a way that they are only compatible with type (B) printers, regardless of the setting of *IGNORE.

This means that the hapless user will have been forced to configure his printer to be type (B) but will not have re-configured his Archimedes since the software will override the settings and work anyway. They then go out and purchase a **correctly** written package, such as System DeltaPlus etc, and the result is a type (B) printer (generating no line feeds) on a machine configured for a type (A) printer (and so sending no line feeds) which results in no line feeds at all and the text all comes out on the same line.

A subsidiary problem occurs in some cases, when reconfiguring the Archimedes to work with type (B) printers, as is necessary if you wish to use both First Word Plus/Logistix and other, correctly written, software. The correct way to do this is to enter the command *CONFIGURE IGNORE with no parameters, completely disabling the printer trap. It is **not correct** to enter *CONFIGURE

IGNORE 0 as this prevents code 0 from being sent to the printer and may corrupt some graphics/font change sequences used by certain software.

Conclusions – If you are using any package which overrides the Acorn protocols for printer compatibility in the way described above and also wish to use correctly written software (in my case, I use both Logistix and System DeltaPlus), you should take the following steps:

1. Set your printer so that Auto Linefeed is OFF (usually a DIP switch).
2. Enter *CONFIGURE IGNORE
3. Press <ctrl-break> to reconfigure your machine.

This now only leaves us with one question – why are Acornsoft apparently condoning this system of forcing the user to have a printer type different from that for which the machine is configured by default?!

• **PC Emulator Star Commands** (Response to query in Archive 2.5 p5) – There is no need for a *Configure Floppies command from the PC emulator when copying from one 3.5" disc to another. You must understand the distinction between logical and physical drives: logical drives are known to the emulator as A, B, C, etc, and are mapped onto the physical drives 0, 1, etc. It is possible to have more than one logical drive assigned the same physical drive. This is what happens when you have your Archimedes configured for one floppy – the emulator maps logical drives A and B onto physical drive 0 and, recognising this when you copy from A to B, prompts for a disc change. If you have two floppies, the emulator maps A and B onto 0 and 1 respectively. I use an external 5.25" 40/80 track drive on my Archimedes and my config.sys file, listed below, illustrates the way around the problem.

```
device=driver.sys /d:0 /t:80 /f:2
device=driver.sys /d:1 /t:80 /f:2
device=driver.sys /d:1 /t:40 /f:0
device=driver.sys /d:1 /t:40 /f:0
files=20
buffers=10
```

The first four lines assign more logical drives (which the emulator gives the letters C, D, E and F) to the physical drives 0 and 1. The meaning of the parameters is:

```
/d: physical drive number
```
(0 for internal, 1 for external)
```
/t: number of tracks on disc
```
(80 for 720k and 40 for 360k)
```
/f: disc format
```
(2 means 720k, 0 means 360k)

The first line assigns logical drive C to physical drive 0. You can now copy from 3.5" to 3.5" by using 'copy a:x.dat c:' and DOS will prompt for a disc change. The second line maps logical drive D to physical drive 1, enabling copying between 5.25" 80-track floppies (copy b:x.dat d:). The last two lines assign two 40-track drives (E and F) to physical drive 1, allowing copying between 40-track 5.25" discs (copy e:x.dat f:) in the same way.

You should be aware that loading all these device drivers will use up some application workspace, leaving less for programs, so only install them when you need them!

• **Three SWIs** which are not mentioned in the Programmer's Reference Manual (Issue 1):

```
OS_AddToVector &47
OS_WriteEnv &48
WaveSynth_Load &40300
```

(WaveSynth_Load was mentioned but not identified in Archive 1.8, p9)

Also, there is one SWI which seems to have been mis-spelled in the Arthur 1.20 ROMs, namely:

```
Sound_QSDispatch &401C4
```

The 'S' between Q and Dispatch shouldn't be there. If you refer to SWIs by name rather than number then you must mis-spell this one in the same way otherwise it won't be recognised!

• **Infinite energy for ThunderMonk** – J.R. Donaldson sent in this program, which will alter your ThunderMonk disk to give you infinite energy.

```
10 REM > Thun_Cheat
20 REM Joe Pineapples - Cool Assassin
30
40 DIM sector% &400
50
60 MODE 0
70 PRINT "Please insert ThunderMonk
                disc and press a key."
80 G = GET
90
```

```
100 PRINT '"Now loading relevant
                              sector"'
110
120 SYS "ADFS_DiscOp",, 1, &C6400,
                         sector%, &400
130
140 PRINT "Do you want to play
                  (C)heat or Normal ?"
150 G = GET
160
170 IF G=ASC("C") OR G=ASC("c") THEN
180   sector%!&388 = &E59C0044
190   sector%!&38C = &E28000FE
200   sector%!&390 = &E58C0044
210   ELSE
220   sector%!&388 = &059C0044
230   sector%!&38C = &02400001
240   sector%!&390 = &058C0044
250 ENDIF
260
270 PRINT '"Now saving relevant
                              sector"'
280
290 SYS "ADFS_DiscOp",, 2, &C6400,
                         sector%, &400
300
310 PRINT "Change complete. Now use
                       disc as normal."
320 END
```

• **Thunder Monk passwords** – the Thunder Monk passwords change from disc to disc *(or do they change from month to month? Ed)*, but they can be found at address &4E400. Just find your level two password in the list below and next two words will be used for levels three and four e.g. our level two password is STEVES so the passwords for the next levels are BIRTHDAY and MIDSUMMER.

SHIRT JUMPER WELLIES Y-FRONTS
LOVERS HEARTS CUPID VALENTINE
DANIEL AND SIMONS BIRTHDAY JOKES
SHOWERS FOOL SPRING POLE EXAMS
SUNNY STUDY STEVES BIRTHDAY
MIDSUMMER WARMER HOLIDAYS MAJORCA
SUNHAT HOTTER RESULTS FAILED
PASSED PISSUP SCORCHER RESTART
SUNBURN ARCHIE SPOOK SHIVER
HALLOWEEN COOLING BONFIRE WEEEEEE
FIREWORKS CHILLY CHRISTMAS HOLLY
PRESENTS MERRY!

(D'you get the significance of the passwords?? Ed.)

• **View to FWP** – When using the utility provided with First Word Plus to convert View files, Robert Leon noted that the left margin default (in the Print File dialogue window) should be changed to 4, otherwise the file is not printed properly.

• **Using 1st Mail for multi-column printouts** – David Scott – Text which is to be printed in more than one column is first prepared with First Word Plus and it is at this stage that preparations must be made for the print format. The text format must suit the final required column width otherwise First Mail will ignore the instructions to print out in multi columns.

An example will show how to lay out the text. Suppose that you require two columns each 31 characters wide set side by side on a 65 character wide sheet. This will be possible as it allows 3 characters for the central white column since

```
31 + 3 + 31 = 65
```

The text must be prepared using a line length of 31 characters. The page markings in First Word Plus will show final page 1 column 1 as page 1, final page 1 column 2 as page 2, final page 2 column 1 as page 3 and so on.

When the text has been fully prepared enter First Mail and follow the instructions given on pages 196 and 197 of the manual. The number of columns must be set to 2 in this example.

• **Another possible bug in First Mail** – David Leckie – When using First Word Plus with the ruler set to double line spacing, continuous text, i.e. no returns are double spaced but text followed with a return is not double spaced as you would expect.

However when a First Mail mail-merge is done from the file, the mrg file contains double spaced text where there was single spaced text in the original doc. Thus if you want, say, your address lines to be double spaced then they should be a RETURN between each line in the doc file only if you are not going to do a First Mail mail merge. If you are doing a mail merge then they should be single spaced i.e. no RETURNS because after the mail merge double line spacing will be inserted! Very funny! A

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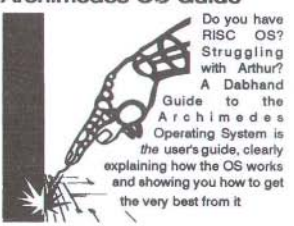

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RISC-OS Hints & Tips

• **"Memalloc" module** – John Fidler was playing with the !Lander program in RISC-OS when he realised that it should not have run with the configuration settings on his machine. He looked in the !Lander directory (by clicking on the icon in the directory viewer while holding the <shift> key) and found the Memalloc module.

This module provides nine new star commands, which allow you to check and alter the size of various memory pools i.e. system heap, RMA, screen area, sprite area and font cache.

```
==> Help on keyword MemAlloc
Module is: MemAlloc util 0.11 (06
    Dec 1988)
Commands provided:
SystemSize RMASize ScreenSize
    SpriteSize FontSize
RAMFSSize RMAFree SpriteFree
    FontFree
```

• **Desktop ScreenSize configuration** – When using the desktop, the memory allocated to the screen area is regulated by the desktop screen mode and not the configuration setting e.g. if you are in mode 12 then the screen area will have 80k allocated to it (or 96k for the 400 series).

• **Desktop startup commands** – When starting the desktop using *Desktop, you can make the Archimedes run a file or perform a star command. This facility could be used to start the desktop up in a predefined state.

```
==> Help on keyword Desktop
*Desktop starts up any dormant
    Wimp modules, and also passes
    an optional
*command or file of *commands to
    Wimp_StartTask.
Syntax: *Desktop [<*command> | -
    File <filename>]
```

• **Converting ArcTerm 6.01** to RISC-OS – ArcTerm 6.01 will work under RISC-OS if you make a !Run file in the !ArcTerm application directory:

```
RMEnsure InternationalKeyboard 0.17
RMReInit InternationalKeyboard
DIR <Obey$Dir>.!ArcTerm
Run ArcTerm
```

• **Extra Options for the Copy Command** – The new User Guide (page 208) lists a number of new options for the Copy command which considerably extend its usefulness. The L and N options are particularly useful for performing backups from hard disc to floppy disc. Thus the command:

```
*Copy HD::$.A.* FL::$.* ~CFQR
```

will make a quick backup, without confirmation, of all the files and subdirectories in directory A of the hard disc named HD onto the floppy disc named FL. If however the option N is also added then only the files which have changed since the last backup will be copied, thus reducing the backup time considerably. If the L option is also added then even more time is saved as the directories of both source and destination disks are checked before any attempt is made to load the files themselves.

If suitable Copy commands are added to the end of an application !Run file then an automatic backup of changed files can be made when you have finished using the application. In this case it is vital to quote the name of the required backup floppy disc so that a request to load it can be given if it is not already in the drive.

• **RISC-OS RS423** – Richard House says that using RISC-OS he can now communicate with his BBC Model B at 19200 baud, without any errors (whereas under Arthur 1.2, even with the patch, he was limited to 9600 baud).

• **Diagram II using RAMdisc** – Load the file "Setup" and change the "8" in lines 10045, 10750, 10765, 10805 and 11325 to "23". This will cause it to access the ram-disk (assuming you copied Diagram II over to the ram-disk) thereby running much faster during scrolling and saving wear and tear on your floppy or hard disk. (J.Daniels of Pineapple Software)

• **MIDI !Maestro** – One reader says that there is an undocumented facility in the !Maestro application which can play a MIDI instrument if the MIDI podule is fitted.

• **Typing control characters** – If you wish to use a "non-keyboard" character under RISC-OS, just hold down the <ALT> key and type in the character number on the keypad.

• **RMReInit SpriteUtils** – Many applications unplug modules and reinitialise them later. Often, under RISC-OS, the SpriteUtils module does not get reinitialised. If you have any problems loading sprites or get the "SWI not known" error, you can check whether your modules have been reinitialised properly by typing *ROMModules.

One reader says that 'Pacmania' can be cured of this by adding the following line to the !BOOT file:

```
935 *RMReInit SpriteUtils
```

• **Multi-Tasking** – How many tasks can RISC-OS run simultaneously? The manual doesn't say, so I decided to find out by loading multiple copies of the desktop clock. When I tried to load the 29th clock I got an error message "Too many tasks", making the upper limit 28.

• **Leaving the Desktop from a Command File** – David Scott – The answer to my own previous help query is actually quite simple when you know how! The last command in the file, which must be an obey file, (it does not work with an exec file) must be:

```
*fx138,0,252
```

which simulates pressing <control-shift-f12>.

• **Space for large applications** – The methods used by Acorn and other suppliers of application software to load their applications which require a lot of space, seem to be both devious and, in many cases, ineffective since they result in less space being available for the application than under Arthur 1.2.

The method illustrated below allows over 300k of data space in Logistix or over 600k of memory with the PC Emulator on a 1Mbyte machine. The technique is a three stage process and is illustrated for Logistix.

Note that the machine will have to be reset after using the application in order to restore all the normal modules and their facilities.

Note also that the amount of free space will vary depending on the configuration settings. In my case, these are 80k for the screen (Mode 12) and 0K for System sprites, font cache and RAM FS.

If you use Econet then the modules NetFS, NetPrint, BBCEconet, NetFiler and NetStatus should also be killed in Stage 2. If you do not use Econet then you will gain marginally more space for all applications by *Unplugging these modules as I have done.

Stage 1 – Set up the standard !Run file for the application so that it sets a function key to execute the stage 2 file after quitting the desktop.

```
| >$.!Logistix.!Run
IconSprites <Obey$Dir>.!Sprites
Key1 Quit|MDir $|MExec
    $.!Logistix.Lgx1|M
Fx138,0,252
Fx138,0,129
```

Stage 2 – This file must be an command file (not Obey). It clears the temporary modules and then kills all the unwanted modules. A function key is then set up to execute Stage 3 and the file ends by recovering the freed space using the RMTidy command which must be the last command in the file.

```
| >$.!Logistix.Lgx1
RMClear
RMKill Debugger
RMKill Desktop
RMKill WindowManager
RMKill FontManager
RMKill InternationalKeyboard
RMKill SoundScheduler
RMKill StringLib
RMKill Percussion
RMKill SpriteExtend
RMKill Draw
RMKill Hourglass
RMKill Podule
Key 1 *Obey $.!Logistix.Lgx2|M
FX138 0 129
RMTidy
```

Stage 3 – This Obey file sets the current directory (it was cleared by the radical effects of RMtidy) and then loads the Floating point emulator and Logistix directly. The final line is an optional backup command which automatically backs the new and changed data files up to a floppy disc (named S1 in this case).

```
| >$.!Logistix.Lgx2
Dir $.!Logistix
RMLoad $.!System.Modules.
                              FPEmulator
Lgx
COPY :DJS.!Logistix.Sheet.* :S1.*
                                ~CFLNQ
```

PC Emulator – The method is similar for stages 1 and 2 except the following additional modules can be killed in stage 2: SystemDevices, TaskManager, PaletteUtil, Filer, ADFSFiler, RAMFSFiler, ShellCLI and RamFS. Stage 3 is not required as the line which sets the function key termination command is:

```
Key 1 PC.Emulate|M
```

which enters the PC Emulator directly. Note that the PC directory must be in the root and must be called PC otherwise the Emulator fails during loading.

• **Getting First Word Plus started** – further to the comments on page 20/21, last month, it is **not** a good idea to use *MOUNT as First Word Plus will then not allow you to change discs, *DRIVE should be used and this works fine. My machine is configured to boot with the external drive selected, which usually holds a "library disc", which is how I discovered the problem. First Word Plus now boots happily under RISC-OS, including an amended version of the key press module which traps <ctrl-f12> to provide a command line similar to that on the desk top – i.e. scrolling up from the bottom of the screen. (*We'll try to get hold of this for the monthly disc. Ed.*)

• **First Word Plus from the RISC-OS desktop** – create the following run file:

```
!Run
| !Run for !First Word Plus+
   version 0.01
IconSprites <Obey$Dir>.!Sprites
WimpSlot -min 400k
set FirstWordPlus$Resources
   $.Resources.1wp.
set FirstWordPlus$Docs &.1wp.
echo<5><23><17><7><6><8><0><8><0>
                          <0><0><0><0>
run "<FirstWordPlus$Resources>1wp"
```

• **First Mail under RISC-OS** – David Leckie – While First Word Plus has drawn a lot of comment, very little mention has been made First Mail, the mail merge program that accompanies it.

When run under RISC-OS the main window will not resize. Now this may not seem like much of a problem but the trouble is that the printer window is hidden under the main window and cannot be easily accessed.

Fortunately the corners of the window are just visible and can be clicked on. The printer driver window pops up when clicked on ok, but while the destination printer window can be clicked on, the name of the selected destination printer is still hidden. This problem is compounded by the last line of the 1st paragraph on page 154 of the manual being wrong. "The four options Parallel Port, Serial Port, Network Port and Disc will appear in rotation.

They do not rotate in the order above. Parallel Port is the first and Disk is the third not fourth but which is network and serial? Can someone with Arthur please tell us?

Thus, if you want to do a merge to parallel printer it works fine. For disc, point to the corner of the window and give 2 clicks (not 3). If you need serial or network, try 1 or 3 clicks.

Thanks to Mark Burch who helped to crack the problem.

• **Installing Artisan** – Sean Kelly – There are three tips: the first is on getting Artisan to return control to the desktop without resetting the system; the second is on putting Artisan in any chosen directory; the third is not strictly related to RISC-OS, but is on persuading Artisan to work with compressed screens.

Returning to the desktop – When Artisan is installed as described on the RISC-OS support disc, it does not return correctly to the desktop. The following modification was made to the program on my A440, and works perfectly:

1. Load program ART5 and, using the BASIC EDITOR, find the line: "DEF PROCLAR"

2. The next line should be a multi-statement line containing in-line assembly code. If so, you have found the correct routine. Delete everything on this line except for the first three statements and then add ":QUIT" so that the new line reads:

```
MODE12:OSCLI"FX4":OSCLI"UP":QUIT
```

3. Rename the old ART5 (in case you have made a mistake) and save the new version as ART5.

This new version returns to the desktop, in the same condition as when Artisan was called, when you quit Artisan.

Altering the directory structure – When installed using the hard disc install program, Artisan insists on living in a directory called :4.$.Artisan. This can be changed – the following details relate to my chosen directory of :4.$.APPS.!ARTISAN.

1. !RUN should be altered from the support disc version. The new version is:

```
ECHO <22><&8C>
WIMPSLOT -MIN 200k
DIR :4.$.APPS.!ARTISAN *** put
    your own directory here ***
URD @ BASIC ART4
```

In my case, the pathname of !RUN is ":4.$.APPS.!ARTISAN.!RUN". Before changing !RUN, rename the old one in case of accident.

2. Alter ART5 using the Basic Editor. Several lines need changing; in each case the change consists of altering the given directory to point to your new directory. The lines that need altering can be found by searching for the following strings using the editor (they are all unambiguous, but the case of each letter is crucial):

```
cLare%=FALSE:
A%=cLARESMI
WHEN12:OSCLI
WHEN1:OSCLI"LOAD
OSCLI"CDIR
OSCLI"DIR "+ClA$+
```

Preserve the old ART5 in case of problems.

• **Adapting Artisan for Compressed Screens** – I use a modified version of the screen compression routine originally published in Personal Computer World magazine. It uses the commands *CSCREENLOAD and *CSCREENSAVE to load and save compressed screens, and compressed screens are given the filetype &010. The adaptation below will work equally well with other compression routines with the proviso that the compressed screen loading routine must recog-nize and correctly deal with normally saved screens (filetype &FF9).

1. Load ART5 and modify it using the BASIC Editor (first rename ART5, in case of errors). Immediately after the REM statements at the start of the program, add these two lines (substituting your own compressed screen save and load commands):

```
*SET Alias$SCREENSAVE CSCREENSAVE %0
*SET Alias$SCREENLOAD CSCREENLOAD %0
```

Substitute the names of your own commands for CSCREENSAVE and CSCREENLOAD.

2. Find DEFPROCcLaRESM with the editor. Look about 14 lines down and there will be a line beginning with WHEN&FF9. Four lines further down should be a line beginning with ENDIF. Add two new lines after this ENDIF line (substituting your own compressed screen filetype):

```
WHEN &010
RES%=3:mIC%=ReSM%:ReSM%+=1:cLarESM%=7
```

3. Find DEFPROCPS with the editor. Look about seventeen lines down and there will be a line beginning with WHEN&FF9. Six lines further down should be a line beginning with ENDIF. Add two new lines after this ENDIF line (substituting your own compressed screen filetype):

```
WHEN &010
PROCGw(laRES%): clArES%=4
```

The modified version of ART5 will correctly handle compressed and uncompressed screens for loading, and will normally save screens in compressed form.

• **RISC-OS Postscript Printer Drivers** – One of our readers can only use a laser printer from an Apple Mac, but wanted to obtain good quality images of the documents that he produced in !Draw and !Edit. In order to do this he redirected the output of the !PrinterPS to a file and 'ported' the file across to the Mac. The reason why this works is because the output of !PrinterPS application is straight ASCII Postscript text, so in theory, the resulting file could be used by any Postscript set up.

• **Configuring !PrinterDM** – some readers have had problems outputting to their dot matrix printers. This might be because the !PrinterDM application must be configured for the printer you are using.

This can be done by clicking, with <select>, on the printer icon (once installed) and then clicking on the printer name that appears in a window, until the name of your printer appears. Then select the "Save Choice" option on the !PrinterDM menu. The printers that !PrinterDM supports are: Epson FX, LQ, and LQ-850 compatibles and the NEC Pin-Writer P6 plus.

• **RISC-OS multisync text scaling solution!** – Richard Averill – If you turn back to Archive 2.9 p14, you will see the problem of text scaling in multisync modes raised. Having also experienced this problem, I tried to solve it.

Firstly, I tried using the output to sprites feature to modify this. Since this did not alter the size of the font at all, I then tried a more interesting method. I knew that the standard vdu 5 font size was 8x8 pixels, so I ran the following program to tell me which locations in the operating system's workspace (&0000-&7FFF) contained the value 8.

```
10 REM > $.TextSize.Find8
20 REM (C) Richard Averill, 1989.
30 FOR I%=0 TO &7FFC STEP 4
40 IF !I%=8 THEN PRINT ~I%;
50 NEXT
```

I then had a list of locations, so I set vdu 5 mode and *Memory'ed each of the locations to have a closer look. Storing 16 in the second location (&1360) caused the x text size to be doubled! There were 3 more 8's consecutively after this value, so after a little testing I came to the conclusion shown by the following table:

Address	Contents
&1360	x size
&1364	y size
&1368	x spacing
&136C	y spacing

All values are given in pixels, so by default these are 8,8,8,8. The WIMP manager changes the x and y values according to the x and y 'eig' factors read by swi OS_ReadModeVariable detailed in OS1.2 PRM pages 124–126. Note that the values need not be multiples of 8, but the characters will look rather odd otherwise!

The following procedure will enable you to set the text size and spacing. The syntax is PROCtextsize(x size, y size, x spacing, y spacing).

```
10000 DEF PROCtextsize(x%,y%,sx%
                                ,sy%)
10010 !&1360=x%
10020 !&1364=y%
10030 !&1368=sx%
10040 !&136C=sy%
10050 ENDPROC
```

For example, PROCtextsize(16,8,16,8) will give you double width text when in VDU 5 mode. This will be square in mode 12 etc. and of a rectangular shape in mode 20 etc. The text spacing will usually be the same as the text size.

To set the default text size from the RISC-OS desktop (the answer to the query,) run the following program (which is in the "$.TextSize" directory of the monthly disc) from within the desktop, and it will redraw the whole screen to enable the new size to take effect.

```
 10 REM > $.TextSize.SetSize
 20 REM (C) Richard Averill, 1989.
 30 REM restores default text size
    and spacing in the RISC-OS
    desktop.
 40
 50 !&1360=8
 60 !&1364=8
 70 !&1368=8
 80 !&136C=8
 90 SYS "Wimp_Initialise",200,
                  &4B534154 TO task%
100 SYS "Wimp_ForceRedraw",-1,0,0,
                        &FFFF,&FFFF
110 SYS "Wimp_CloseDown",task%,
                          &4B534154
120 QUIT
```

This will set the text size to 8 pixels, the same as under the Arthur WIMP manager. So if you have a high resolution monochrome, the text will become four times smaller in each direction than normal!

Unfortunately, there is a slight problem. The RISC-OS WIMP assumes scaling will be done to ensure that the size of the text is always 16x32 OS units and uses these values when calculating text widths/heights instead of finding the sizes from the operating system. So any vertically centred text (such as window titles) will not be centred properly in multisync modes!

For real compatibility with Arthur 1.2 WIMP applications, you can save the Arthur 1.2 WindowManager module from ROM to disc and *RMLoad this into RISC-OS instead. The Arthur 1.2 WIMP module is in the "$.TextSize" directory of this month's programs disc. A

MS-DOS Column

John Eden

You've probably noticed that the MS-DOS column has not appeared in the magazine since January. Ken Biddle, who edits the column, has decided because of other commitments, that he can no longer continue as editor. The column will not, however, be disappearing from the magazine as I'm pleased to say I have been given the opportunity of editing it for a while.

If all goes well, the column should reappear in the next issue of Archive. What I would like you to do is to send me your ideas or suggestions for topics which you would like to see covered in the column. I can then gauge how best to tackle my new job. Also, if you have any hints and tips on using the emulator or MS-DOS, don't keep them to yourself, send them to me so that I can include them as well.

I hope to be able to maintain the compatibility list that Ken has worked so hard on, so if you have tried and tested any software that isn't included in the current list, please let me know. (Don't forget to say which version of the emulator you tested it on). I am also hoping to take over distribution of the share-ware disc which Ken compiled, although I have not approached him about this yet.

You can write to me either care of Archive, at the usual address, or direct to John Eden, 13 Cranleigh Gardens, Luton, Beds. LU3 1LS (no phone calls please!). Or if you prefer, you can leave me a message on Eureka II, account number 28. A

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TimeWatch can also search for a piece of text in any, or all, of your categories of information; print some, or all, of the information stored in a range of pages; and, by means of the perpetual calendar, move quickly from one page to another.

For those who have made use of the Arthur 1.2 DeskTop Diary, TimeWatch will import the contents of the diary files.

DiscTree

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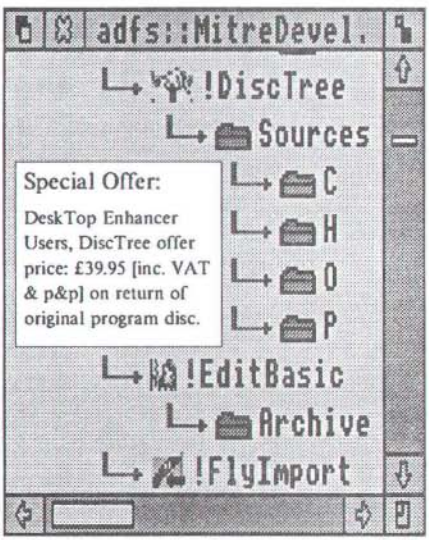

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VISA

Sprite-Plotting for Games

Bjørn Fløtten

There are various techniques needed when writing high speed graphics oriented games. Bjørn gets us started with a few of those techniques.

Fast Screen clearing

In a game like my own shareware game YAIG (Shareware N°8), you have two alternatives when deleting the old sprites on the screen. You can delete either the whole screen, or each sprite in turn.

When you have many sprites on screen simultaneously, deleting the whole screen is faster and this is also more convenient when using bank-switching.

This article explains how YAIG's screen-clearing routine works, and also the assembly techniques used. For those of you not familiar with ARM-code, I recommend having Cockerell's ARM Assembly Language Programming book at hand. *(Now, sadly, out of print. Ed.)*

A simple machine-code routine for clearing the screen could look like this:

```
screen_startR=0
screen_sizeR=1
pointerR=2
nullR=3
[
.clear_screen
MOV nullR,#0
ADD
    pointerR,screen_startR,screen_sizeR
.loop
STR nullR,[pointerR,#-4]!
CMP pointerR,screen_startR
BNE loop
MOV R15,R14
]
```

Setting A% = screen-start and B% = screen-size and calling this routine will clear the screen. The routine assumes that the screen-size is a multiple of 4 bytes.

This routine takes about 30 milliseconds (30 ms) to execute in MODE 13.

The following function will return the start of the screen, when not scrolled.

```
DIM par_block 11
DEFFNscreen_address
!par_block=149
par_block!4=-1
SYS 49,par_block,par_block+8
=par_block!8
```

Now, let's use the STM instruction instead of STR. Replace `MOV nullR,#0` with

```
MOV R3,#0
MOV R4,#0
MOV R5,#0
MOV R6,#0
MOV R7,#0
MOV R8,#0
MOV R9,#0
MOV R10,#0
```

and replace the STR instruction with

```
STMFD (pointerR)!,{R3-R10}
```

This routine will be executed in around 10 ms. It assumes that the screen-size is a multiple of 32 bytes (because 32 bytes are stored between each CMP instruction).

Can the routine be made to be executed even faster? Yes, by using:

```
CMP pointerR,screen_startR
BNE loop
```

is executed once for every 32 bytes and we do not need to check if we are finished every 32 bytes, we could check instead every 1024 bytes, since all screen-sizes are a multiple of 1024 bytes. This is done by repeating the STMFD instruction 32 times in the program listing. We now have a routine which executes in about 5 ms.

Just repeating the STMFD 32 times in the source code is a clumsy approach. Using the excellent macro-facility of the BBC BASIC assembler you can replace the STMFD instruction with:

```
FNstore(32)
```

and write a function

```
DEFFNstore(times)
LOCAL assemble
```

```
FOR assemble=1 TO times
 [
 STMFD (pointerR)!,{R3-R10}
 ]
NEXT
="""
```

This will assemble the STMFD 32 times, or any number of times you want.

Remember that the screen-size **must** be a multiple of the number of bytes stored between each CMP instruction, or else you will get an infinite loop (as pointerR will never EQual screen_startR). It might be an idea to change the number of registers stored with the STM instruction, adding R11 and R12 will increase the speed a little bit more.

The observant reader among you may by this time have asked: Why not just use CLS? The answer to this is that CLS resets any OS_Word &19 calls (write screen base-address), so you cannot use bank-switching. My routine does of course also have other purposes than mimicking the CLS command. You could for instance clear the screen to other values than zero, or use it for fast clearing of other areas of memory.

Fast Sprite Plotting

We will now look at a complete example of how to plot sprites in machine-code in the fastest (?) possible way. The code is extracted from my shareware game YAIG (Shareware disc N°8).

Anyone who has tried to use the sprite-routines in Arthur 1.20 for game-writing, will have discovered that they are not fast enough. This is not necessarily because the programmer have done a bad job, but because these routines cannot be specialised for just one specific task.

My routine plots sprites with sizes up to 24x24 pixels, in MODE 13. Black pixels are not plotted. The routine uses what I call internal screen-co-ordinates, with the position 319,255 corresponding to the right downward corner of the screen. It uses direct screen-access, and is (I think) as fast as it can be on the Archimedes (for this type of sprites). The routine is not able to plot sprites which are only partly onscreen. (YAIG has this capability, so I may write an article on this subject later).

All sprites are stored in 592 bytes, with 16 bytes information about the sprite, and 572 bytes (24*24) of pixel-data. Byte 0 : Width of black area to left of sprite 1 : Height of black area over sprite 2 : Width of black area to right of sprite 3 : Height of black area under sprite 4-15 : Not used

16-591 contains the actual pixel information. MODE 13 is a 256 colour mode, so every pixel corresponds to one byte. If the sprite looks like:

(Imagine that what you see here is a rectangle 24x24 pixels wide, with a sprite in it which is smaller than 24x24 pixels)

Then it will be stored as:

Byte 0 of the definition then tells us how many pixels the sprite has been moved towards the left, while byte 1 tells us how many pixels it has been moved upwards. This information must be stored, because the sprites are plotted as in the first figure. That is, the plotting-routine "moves" the sprite back into the middle of the rectangle. Byte 2 and 3 opens for speed-improvements, because they tell the plotting routine how many pixels it can skip when plotting (black pixels are not plotted).

When plotting, all sprites are treated as 24x24 pixels sprites, that is, the xy-position given to the plotting routine corresponds to the upper lefthand corner of the rectangle (not the upper lefthand pixel of the sprite). This make it easier to replace existing sprites (making them bigger for instance). (In YAIG, the collision-detection routine also uses the first 4 bytes of the sprite-definition, to find how big the sprite is.)

Of course, if all sprites where of size 24x24 pixels, then there would be no need for this rather complicated storage method. But for YAIG it is ideal, as the game uses sprites with a mix of different sizes. Remember that in general, the more information that is stored together with a sprite, the faster it can be plotted. Do also remember that for your specific task, a different plotting-routine may be much faster.

If you do not have YAIG, with the file SPRITES, then you will have to make some sprites in the format described.

The program should be self-explanatory if you read through the REM statements. I hope you find it useful.

```
 10 REM >PlotSprite
 20 REM A simplified extract of the
 30 REM ARM-routine, tegn_fartoy,
 40 REM in the game YAIG
 50 REM
 60 REM By Bjorn Flotten
 70 REM
 80 REM 26.05.1989
 90
100 REM Number of sprites defined in
                    sprite-definition file
110 MAX_SPRITES=135
120
130 numbers=1000
140
150 PROCsetup
160 MODE 13
170
190 B%=FNscreen_address
200 REM Plot sprites with random positions
210 time=TIME
220 FOR plot=1 TO numbers
230   A%=RND(MAX_SPRITES)*592
                          +sprite_data
240   C%=RND(296)
250   D%=RND(231)
260
270   CALL plot_spriteMC
280
290 NEXT
300 PROCprint_result(TIME-time,numbers)
310
320 REM Try deleting the call-
        statement, and see how much time
330 REM the BASIC-loop uses!  (Even
          inserting these REMs into the
340 REM loop degrades performance
                        substantially.)
360 END
390 DEFPROCprint_result(total,numbers)
400 PRINTTAB(0,0)"Time used for ";
    numbers" sprites: ";total"/100 sec."
410 PRINTTAB(0,1)"This corresponds to a
            plotting speed of ";INT(1/
                    total*numbers)*100
                  " sprites per second"
420 ENDPROC
430
450 DEFPROCsetup
470 DIM code 2000
480 DIM par_block 11
490
500 REM Load in the file containing the
                      sprite-definitions
510 REM (The file SPRITES is bigger than
  the reserved area, so the following
520 REM is walking on thin ice)
530 DIM sprite_data 592*MAX_SPRITES-1
540 OSCLI("LOAD SPRITES "+STR$~
                          (sprite_data))
550
560 P%=code
570 PROCass_plot_sprite(P%)
580 PRINT"Press any key"
590 dummy=GET
600 ENDPROC
610
630 DEFPROCass_plot_sprite(kode%)
640 sprite_pointerR=0:REM A%, pointer to
                        sprite-definition
650 screen_addressR=1:REM B%, pointer to
                          start of screen
660 xR=2 :REM C%, sprite x-position
          (internal coordinate, 0-296)
670 yR=3 : REM D%, sprite y-position
          (internal coordinate, 0-232)
680 data5R=4
690 screen_pointerR=6
700 data1R=9 : pixels_xR=9
710 data2R=10 : pixels_yR=10
720 data3R=11
730 data4R=12
740
750 FORpass=0TO2STEP2
760   P%=kode%
770   [OPTpass
780   .plot_spriteMC
790   REM This routine does not check
    for illegal values for xy-position.
800   REM Use of illegal values may
                  result in an "abort on
                    data-transfer" error
820   REM A sprite can be imagined as
    stored in the upper lefthand corner
830   REM of rectangle 24x24 pixels wide
840   REM All sprites are however
              plotted in the middle of
                    a 24x24 rectangle
```

```
850   REM The upper left hand corner of
          the rectangle corresponds to
860   REM the x,y position given in xR
                                  and yR
870   REM This arrangement means all
        sprites can be treated as 24x24
880   REM pixels wide and makes
         possible some speed-optimization
890   REM when plotting.
900   REM
910   REM But it demands that the
           information about the width of
920   REM the blank fields around the
        sprite are stored together with
930   REM the sprite definition. The
              width of the fields to the
                left and over the sprite
940   REM must be known by the plotting
             routine, so it knows by how
950   REM much it must adjust the x and
             y position before plotting.
960   REM (to "move" the sprite into
           the middle of the rectangle)
970   REM
980   REM The widths of the fields
                under and to the right of
                      the sprite, tells
990   REM the plotting-routine which
           pixels it need not care about.
1000
1010  REM NOTE, pixels_x/pixels_y and
     data1/data2 are the same registers
1020  MOV pixels_xR,#24
1030  LDRB data3R,[sprite_pointerR] :
              REM Width of field to left
                                of sprite
1040  SUB pixels_xR,pixels_xR,data3R
1050  ADD xR,xR,data3R
1060
1070  MOV pixels_yR,#24
1080  LDRB data3R,[sprite_pointerR,#2]
       : REM Width of field over sprite
1090  SUB pixels_yR,pixels_yR,data3R
1100  ADD yR,yR,data3R
1110
1120  LDRB data3R,[sprite_pointerR,#1]
           : REM Width of field to right
                                of sprite
1130  SUB pixels_xR,pixels_xR,data3R
1140
1150  LDRB data3R,[sprite_pointerR,#3]
      : REM Width of field under sprite
1160  SUB pixels_yR,pixels_yR,data3R
1170
1180  REM Increment sprite_pointer so
                    it points to the real
1190  REM definition of the sprite.
1200  ADD sprite_pointerR,sprite_
                         pointerR,#16
1210
1220  REM Initialise the screenpointer
1230  MOV data4R,#320
1240  MLA screen_pointerR,yR,data4R,
                       screen_addressR
1250  ADD screen_pointerR,screen_
                         pointerR,xR
1260
1270  REM data3R must contain constant
           255 for the AND operations
1280  MOV data3R,#255
1290
1300  REM Check how wide the sprite is
        and call corresponding routine
1310  REM If you want to use sprites
              smaller than 8x8 pixels,
1320  REM you could easily implement a
               plot_8_x_pixels routine
1330  REM Try putting REMs in front of
        following 6 lines, and see how
1340  REM much time you gain by
           checking for small sprites.
1350  CMP pixels_xR,#12
1360  BLO plot_12_x_pixels
1370  CMP pixels_xR,#16
1380  BLO plot_16_x_pixels
1390  CMP pixels_xR,#20
1400  BLO plot_20_x_pixels
1410
1420  .plot_24_x_pixels
1430  FNplot_x(24)
1440  BNE plot_24_x_pixels
1450
1460  MOV R15,R14
1470
1480  REM Instead of using the macro
              plot_x here, you can also
1500  REM insert the code directly:
1510  REM
1520  REM .plot_12_x_pixels
1530  REM  FNplot_4_pixels
1540  REM  FNplot_4_pixels
1550  REM  FNplot_4_pixels
1560  REM  ADD screen_pointerR,screen_
               pointerR,#320-(pixels*4)
1570  REM  ADD sprite_pointerR,sprite_
                  pointerR,#24-pixels*4
1580  REM  SUBS pixels_yR,pixels_yR,#1
1590  REM  BNE plot_12_x_pixels
1600  REM
1610  REM This will assemble in the
        same way and is a bit clearer.
1620  REM But BASIC source code will
              of course be much longer.
```

```
1630   REM For plot_16_x_pixels you
      would have to call FNplot_4_pixels
1640   REM four times and so on.1650
1660   .plot_12_x_pixels
1670   FNplot_x(12)
1680   BNE plot_12_x_pixels
1690
1700   MOV R15,R14
1710
1730   .plot_16_x_pixels
1740   FNplot_x(16)
1750   BNE plot_16_x_pixels
1760
1770   MOV R15,R14
1780
1800   .plot_20_x_pixels
1810   FNplot_x(20)
1820   BNE plot_20_x_pixels
1830
1840   MOV R15,R14
1850   ]
1860 NEXT
1870 PRINT"Plot-sprite,    &";~kode%
        "-&";~P%-1",";P%-kode%" bytes"
1880 ENDPROC
1890
1910 DEFFNplot_x(pixels)
1920 REM This macro assembles into a
                routine which plots the
1930 REM number of pixels given in the
                      parameter pixels
1940 REM It then updates the screen-
      pointer and the sprite-pointer so
1950 REM that they both point to the
                    next line of pixels
1960
1970 LOCAL gjenta
1980 pixels=pixels DIV 4
1990 FOR gjenta=1 TO pixels
2000   [OPTpass
2010   FNplot_4_pixels
2020   ]
2030 NEXT
2040 [OPTpass
2050 ADD screen_pointerR,screen_pointerR
                        ,#320-(pixels*4)
2060 ADD sprite_pointerR,sprite_pointerR
                            ,#24-pixels*4
2070 SUBS pixels_yR,pixels_yR,#1
2080 ]
2090 =""
2100
2110 DEFFNplot_4_pixels
2120 REM This macro plots 4 pixels of
           the sprite. Black pixels are
2130 REM not plotted (if you want black
                pixels in the sprite, use
2140 REM colour 1, this is almost black)
2150 REM The 4 pixels are loaded into
     data5R, and then the ARM's excellent
2160 REM possibilites of shifting
          instructions, and conditional
2170 REM instructions are utilisied to
                       the full extent.
2180 REM The following piece of code
                       shows why the ARM
2190 REM is so powerful. See how little
          time punishment the checking
2200 REM for black pixels gives, and try
          implementing a corresponding
2210 REM routine on an 80386 or 68030!
                Actually, with many black
                     pixels you gain time
2220 REM as the STR instruction which
     takes a long time, is not executed.
2230
2240 [OPTpass
2250 REM Load the four pixels, and
                update the sprite-pointer
2260 LDR data4R,[sprite_pointerR],#4
2270
2280 REM Find the first pixel, AND'ing
          data4R with 255 gives pixel 0
2290 REM Using the S in AND means an
        automatic check for whether the
2300 REM pixel have colour 0 (black) in
          which case it won't be plotted
2310 ANDS data5R,data3R,data4R
2320
2330 REM In the original code for YAIG
                     you will find that...
2340 REM  STRNEB data5R,[screen_
                               pointerR],#1
2350 REM  ADDEQ screen_pointerR,screen_
                                pointerR,#1
2360 REM instead of the following. But
       that is only complicating things!
2370
2380 REM The use of NE in the STR here,
       means that the pixel is not stored
2390 REM if the result of the previous
                AND instruction was zero
                          (a black pixel)
2400 STRNEB data5R,[screen_pointerR]
2410 ADD screen_pointerR,screen_pointerR
                                    ,#1
2420
2430 REM Find second pixel, AND data4R
          shifted right 8 times with 255
2440 ANDS data5R,data3R,data4R,LSR#8
2450 STRNEB data5R,[screen_pointerR]
2460 ADD screen_pointerR,screen_pointerR
                                    ,#1
```

```
2470
2480 REM Find third pixel, AND data4R
       shifted right 16 times with 255
2490 ANDS data5R,data3R,data4R,LSR#16
2500 STRNEB data5R,[screen_pointerR]
2510 ADD screen_pointerR,screen_pointerR
                                   ,#1
2520
2530 REM Find fourth pixel. There is no
           need to use an AND here, as
2540 REM there are no bits which have to
         be AND'ed away after shifting
2550 REM data4R.
2560 MOVS data5R,data4R,LSR#24
2570 STRNEB data5R,[screen_pointerR]
2580 ADD screen_pointerR,screen_pointerR
                                   ,#1
2590 ]
2600 =""
2610
2630 DEFFNscreen_address
2640 !par_block=149
2650 par_block!4=-1
2660 SYS 49,par_block,par_block+8
2670 =par_block!8
```

A

Help!!!!!

• **RISC-OS problems** – Has anyone: (a) converted the Arthur diary to RISC-OS (b) added keyboard input to !Calc utility (c) know why the PC emulator uses the parallel printer even when a machine is configured to serial. Chris Walker, Wymondham

• **Teletext adaptor** – Does anyone know how to access the old BBC micro Teletext adaptor via the 1MHz bus on the I/O podule? Or does anyone know how it was done on the BBC itself? Apparently, there was a program written by one Gordon Horsington which was downloaded from CEEFAX which allowed you to operate the adaptor without using the ROM routines. This program would help us to see how to write the equivalent for the Archimedes. Any help, please? R.D.Wright, Guildford.

• **Archimedes in Education** – I am interested in getting together a small feature on the Archimedes in Education or a future issue of Archive, possibly focusing on Econet. So if you are a teacher or adviser and have suggestions or comments to make on what you would like to see done on this subject or if you fell you could contribute. Contact me at home in the evenings by phone or by post via Archive or direct to my home address. Matthew Treagus, 30 Hampton Lane, Blackfield, Southampton, SO4 1ZA. A

Small Ads

• **A310M**, 4-slot backplane, I/O podule, Phillips colour monitor, + RISC-OS. £800 (may split). Ring P. Beaumont-White on 01–218–0913 during office hours, pref. Friday p.m.

• **A310** + colour monitor with RISC-OS + Artisan £870. Monitor unused. Trial on premises if required. Richard Averill, 01–643–4013.

• **A310** Entry with RISC-OS, manuals, discs, £650. Write, enclosing phone number if you want, to Lorcan Mongey, 56 Salisbury Court, Belfast BT7 1DD.

• **A310** with RISC-OS in v. good cond. £720 o.n.o. Also a 32k ram chip for CC ROM podule, unused, £12 o.n.o. Ring David Bilsby on 0886–21457.

• **A310** with RISC-OS, 20Mb Acorn Hard Disc, Acorn backplane, possibility of hi-res mono monitor. £1000, must be sold together. Nick on Doncaster (0302) 342858, after 7 p.m.

• **Archimedes BASIC Compiler** (version 2) – £50, Twin editor – £15, Epson JX-80 colour printer – £250. Wanted, RenderBender. Phone Cledwyn on 093884–224.

• **Printer** – MicroPeripherals MP165 IBM/Epson compatible, 160 cps draft / 35 cps NLQ, virtually unused, £110

• **Software** – Orion £6, Terramex £10, Gammaplot £45. All as new. Phone Steve on 0444–892483 (evenings).

• **Wanted – Acorn C compiler** (release 2). Contact Mr C Walker, 16 Finderne Drive, Wymondham, NR18 0HU. (0953–604255)

• **Wanted** – RenderBender. Phone Richard on 0482–634852 after 5 p.m. A

Home Accounts by Minerva

Alan Highet

I have always liked Minerva software, having used it on the 'Beeb' and now on the Archimedes, so it was with interest that I set about reviewing their Home Accounts package. I am the first to admit how hopeless I am at keeping my accounts in order and, until about two years ago, I never knew how much money I had in my bank account. It was then that I purchased an accounts program for the 'Beeb' for approximately ten pounds. The program did everything required of it and I still use it, running under the emulator, on the Archimedes so I was interested to see how Minerva's package would stand up in comparison.

The package consists of a fifty page manual and a disc which is unprotected! *(Yes, it is, I've checked. Ed.)* The software is compatible with either OS 1.2 or RISC-OS and the manual explains fully the differences in operation between the two systems. One difference I noticed is the presence of an interactive help window with RISC-OS which is not mentioned anywhere in the manual. This review is based on OS 1.2 but the RISC-OS version is almost identical. There is a good tutorial section in the manual which is well worth following if you want to get the most out of the software.

The program is completely WIMP based and on booting the disc you are presented with a main menu window from which everything else is accessed. One nice touch here is that to retrieve this window you only need click on it anywhere with <select> to bring it to the front of the screen instead of the more usual method of searching for the back icon in the top left corner. There are seven options on the menu and I shall deal with them in order of use.

Bank Accounts

This is wrongly labeled in my view since credit cards or building society accounts may also be set up. Click <select> on this option and a window opens up. Clicking <menu> on this window gives you the option to enter the account name and also the choice of setting an upper or lower warning indicator. For instance you might want a warning if you are approaching the spending limit on your credit card or the balance on your deposit account is dropping too low.

There are also options to edit an existing account and to delete an account, but only before any transactions are entered thus stopping you deleting a working account by mistake. By double clicking on an account name, a window opens up showing the transactions for that account. From here, you can reconcile your account with your bank statement by simply clicking on the entries that match your statement. The statement balance is shown at the top of the window along with your actual balance. You may also search the records for a specific entry. There is no facility to delete a transaction although if you edit it and enter a zero for the amount, the program removes the entry.

Headers

Clicking on this option opens the Header window. A header is another word for a category such as electricity and rates or credits like wages and tax rebates! Clicking <menu> on this window lets you initially set up as many headers as you want.

This option works together with the previous one to form the main part of the program. To pay an electricity bill from your current account you click <select> on the bank account, drag it to the header window and drop it on the electricity category. A payment window will open showing a payment from the selected account to the selected category on the current date. All you need do is enter the amount and click on [OK]. If the cheque is to cover more than one bill then there is space to add six more categories along with the appropriate amounts.

There is only a small space to enter a reference to identify the transaction and this is one of the things I think lets the program down. I like to record not only the cheque number but also who the cheque was made payable to and there just is not enough room. The only way to do this seems to be to make a separate header for everybody you send a cheque to which would make the list of headers completely unmanageable.

To record receipts such as wages, the process is the same except this time you drag a category from the

header window and drop it on the selected account. Again a window opens with all the details completed and all you need do is enter the amount. You cannot enter a post dated transaction which is a facility I use quite a lot. For instance, I sent a cheque to Archive some time ago for my RISC-OS chips and, although it was dated for the beginning of April, I sent it in February. I therefore needed to enter it in February but instead I had to leave a note pinned up reminding me to enter it in April.

Standing Orders

Both monthly and weekly standing orders are catered for and the numbers of weeks or months may be altered. There is also the option of making the first payment different from the others which is quite common. If, like me, you have a standing order from your current account to a savings account it will automatically credit your savings account as well as debiting your current one.

Graphics

On selecting this option, a blank window opens. You can then drag any bank account or header to this window and a bar graph will appear for the past twelve months showing totals for each month along with a trend line and a budget line. The budget is a set of figures you can set yourself for accounts and headers which forecast expected levels of income or expenditure. I think this facility would be more useful in a business than in the home but some people might like to forecast what they are going to spend each month. You can also combine up to six totals but all that happens is they are added together and the total figure displayed. I would like to have seen the graphs overlaid on each other so that a comparison would have been possible say between income and expenditure for each month.

Reports

This section allows hard copy reports of accounts and headers, both of which can be printed in month by month form or current totals. You can also get a copy of your standing orders showing the amount paid and when the next payment is due. Finally, you can get a report on your actual transactions. The short report is similar to a bank statement giving date, reference, the account name from which the payment was made and two columns, one for debit and one for credit.

This option is fairly readable but the detailed option is a mess. Each transaction takes three lines and even then, one column runs into the next, so that trying to find out where one transaction finishes and the next one starts is very difficult. My other main complaint about this section is that there is no facility to limit the printout to anything other than a full year which means that if, like me, you have a lot of transactions, you will have reams of paper coming out of the printer. I estimate that to print out a detailed copy of my yearly transactions would take thirty-six A4 pages!

Miscellaneous

Here you can clear all the data but only after clicking on a confirmation window. You can sort the transactions into date order and you can delete all items that have appeared on your bank statement and have been checked off. Minerva say in the manual that there is obviously no need to keep them but, as they also say in the manual, 'this program is ideal to keep track of your accounts for the taxman'. Surely then, you want to keep all your transactions for some time.

I have another grumble. The program only stores one year of accounts and, as most people know, the taxman cometh some time after the end of the year. The only way I can see to get round this is that at the end of the year, you save your account data on a spare disc before the program automatically erases it from your working disc. Surely it would be possible for the program to store data for longer than the year – it can't be memory shortage surely!

Filing

This is simply a section to load and save data. A nice touch here is that if you load data with a filename 'mymoney' there is no need to enter the filename again as the program remembers it.

Conclusions

This is a pretty package which I found very easy to use especially with the well illustrated step by step manual. On the negative side are the points I have already mentioned, the printing ones being quite serious. I also think that password protection should have been included. Overall, I do not think that it is worth the high price of nearly fifty pounds and I think I'll stick to my trusty 'Beeb' program. A

Archway – WIMP Tools

Richard Forster

The Archimedes comes with a powerful WIMP environment, which is extremely user-friendly and also very fast. The reverse side of the coin is that it is very difficult and time consuming to program. Under Arthur and possibly RISC-OS (although thanks to Acorn I still await my copy!), a large amount of programming is required for very little end product. Simtron's Archway goes some way towards remedying this unsatisfactory situation.

A very small amount of BASIC programming is needed to get Archway to display a window on the screen. Most of the actual work is done via various tools, all available from a clear set of menus. The hard work is done by a separate program which installs the procedures you write, into itself. Once I had manoeuvred the setting up problems, I had a simple window on my screen within a few minutes.

There are a lot of tools and copying the discs for use – even onto a hard disc – took some time. It was around this point that I encountered my only major problem. When installed on the hard disc, it kept insisting that I insert discs into the floppy drive and then ignoring them. Simtron were very helpful when quizzed about this. It seemed my version had some debugging code which should have been removed. The end remedy was just to press <escape> twice when the program requested a disc.

The packaging

Opening up Archway was a bit like opening up a Magnetic Scrolls adventure – a lot of 'goodies' fell out. You just don't expect to find a beermat in such a package, even if it is there to remind you of their telephone number. Simtron also and very thoughtfully, include a padded envelope for sending your discs back for upgrading to later versions.

There are four discs supplied. Three are full of tools to create the WIMP environment and one disc is there to run the actual programs you've written. The system generally works very well and the discs also contain 18 examples, which are used in conjunction with the manual in learning to use the system.

The manual consists of over 400 ringbound pages. It has a very clear and concise index and is split into five distinct sections. The first two give an introduction to the system. They help you to get the system running and show you how to get a simple window displayed. They also give a rough overview to the whole system and give basic explanations of the various tools.

The third section contains 17 lessons. These enable you to fully operate the system. As the programs are on the disc, there is no laborious 'type in' procedure and you feel much more prepared to fiddle with them. This section was best used in conjunction with the fourth part which explains in detail how to use all of the tools. It is extremely well laid out and its use of headers makes quick reference a pleasure.

The back of the manual covers the BASIC libraries supplied. Many of the functions/procedures are not specifically geared for Archway and they could easily be placed into any program you desired. They included items for maths, sprites, strings and fiddling about with the time and date.

Using the package

In use, the system basically just requires you to boot up the main tools disc and proceed from there. This obviously isn't all there is to it. A large amount of fine tuning of your BASIC program is initially needed. Once this process has been completed however, control is totally by the mouse.

Archway uses a friendly screen layout throughout. The menus consist of the screen split into four parts. The top part displaying various icons and the bottom two lines containing help text. The help text which is given on-line is useful and it was pleasing to see it throughout the package. The middle section contained the actual options.

An excellent editor is supplied to edit pointers/sprites etc. Not having received my RISC-OS yet, I don't know how good !Paint is, but the Arthur sprite editor is really hard work to use but this editor has many of the missing features. You can scroll a sprite, invert it, rotate it, delete columns, even draw lines, though no provision was given for circles.

A similar editor is used to edit any of the types of windows. The consistency throughout the program

meant that very little referrence to the manual was necessary. Once I had got the hang of a few difficult bits, the rest just slotted into place.

The Tools

Archway allows easy editing of the whole of the WIMP environment. You can design windows with various functions, from ones which display a warning and halt everything till a button is pressed, to those which contain scrolling windows and can accept text, contain buttons etc. Depending on the type of window, it will change the amount of programming. The simplest form of window can be done in one line of BASIC whereas a full blown one takes hefty use of the window editor and a much larger amount of programming.

Menus are also well catered for and they take hardly any BASIC programming at all. They can be linked together and set to appear only when the pointer in over a certain window. The text in them can be displayed normally or it is easy to make it become shaded or even ticked.

Archway will easily cater for user resources. Fonts (8x8) can also be edited and automatically entered within you program. Various other tools include a line editor (create customised dotted lines) and automatic programming of function keys to call up certain options.

Once you have designed all the features you simply 'link' them together. This creates files which are accessed by the run-time program. Overall, once you know your way around, you can create a complex WIMP environment very quickly.

One final feature is the library option. Right through the program you can take bits from the comprehensive library, or indeed any of the example programs, or add to it. The library contains some very good sprites and some useful examples of items, like pointers.

Forthcoming features

Archway will be able to combine your windows with ARM code, or even run music editor files. I say 'will', as these functions were not available on the version I had. There are basically 3 versions of Archway; 1.00 is the basic Arthur version which has some features missing, 1.03 is a RISC-OS conversion of the Arthur version but still with the features missing. The new version (1.10) which boasts many more features will be available, according to my information, around June.

The full RISC-OS version will cater for anti-alaised fonts, maestro files, sprite animation and other as yet unmentioned addition to the tools. It will also be fully RISC-OS compatible, catering for application directories, the printer driver, message passing, the filer and multitasking, all keeping within Acorn's guide lines. The whole system will be 'spiced' up in that some parts of the 2 megabytes of program will be put into ARM code.

Conclusion

I read a comment recently saying Archway will be good when it is finished. I am more inclined to believe it will be even better. The software is excellent, the only problems I had with it were due to my own attempts, not the failure of the software. Everything worked as it was supposed to and everything was well documented.

You may ask what you get for your money. You get an excellent piece of software which will make the mountain of programming needed to operate the WIMP environment into a molehill. You also get a well put together manual. Thrown in, you get an excellent sprite editor and of course a beermat!

It is worth mentioning that until the RISC-OS version appears, Simtron offer a free upgrade service. As the RISC-OS version costs 25% more, buying now will save you money in the long run. At the time you are reading this, the RISC-OS version of the Arthur Archway (not the full blown one), may well be available.

As you've probably gathered from this review, I liked the package. Admittedly I had a very shaky start, but since these initial teething troubles I have had no end of use out of this easy-to-use package. It should be seriously considered by anyone interested in using the WIMP environment.

Archway V1.00 costs £79.95 (inc. VAT & p&p). The RISC-OS version will retail at £99.95.

(If anyone is interested, I'll see if Simtron will give us a reasonable discount which I can pass on to subscribers. Ring if interested. Ed.) A

Language Forum

David Wild

Now that RISC-OS is installed, I have begun to think about the changes that it will make to programming practice. We shall all have to come to grips with WIMPs so that we can take advantage of the multi-tasking facilities. One minor point is, what will we need to do to a program which doesn't use the screen? I have one or two programs which act as file filters, reading one file and writing another with some characters changed. Except for telling me that they have completed the run satisfactorily they have no console input or output. Perhaps a call to WimpPoll inside each main loop would do the trick.

Desktop and programs

Although it is not strictly concerned with languages there is another aspect of RISC-OS which is important to all programmers. This is control of the computer when it is being used by other people. In his reply to my comment about BASIC error trapping, Clifford Hoggarth mentions the modules that a user may have added or deleted. This may be an important problem in other ways.

If the Archimedes is a success, most of its users will not be computer enthusiasts and will probably not be using their own machine. In this context, many of the facilities of Desktop become positively dangerous. I know several people that I would not trust with the ability to copy, or even move, files by dragging them on the desktop. These people, who are not malicious but have a tendency to experiment beyond their ability, can do enough damage with the standard MS-DOS commands and I do my best to keep them from ever needing to issue an MS-DOS command.

Because of this, we need standard ways of providing access to programs without making all the facilities of the desktop available. Any ideas as to how this can be done would be very welcome. The "click on a symbol" for access is very helpful, but it may be necessary to write a pseudo-desktop to act as a menu.

We also need to think about how to make sure that all the necessary modules are provided and all the unnecessary modules taken away. This probably means that there is no way in which ordinary business applications can be run on a machine without a hard disk, unless it is operated on a network. It is unlikely that many people would try, because of the file space needed, but it is another nail in the coffin of the floppy-only machine.

Calculating Π

In the June issue of Archive, page 6, a reader complains about the programs that have appeared for calculating the digits of π to many decimal places. In one sense, he is absolutely right because, once the calculation has been done and the results printed, it is never needed again. On the other hand, it is a very good method of comparing the straight computing power of different machines or languages, so long as you remember my comments about programs in different languages being different themselves. A calculation such as this is pure computing, with no complications such as the speed of disc access. There is no screen output until the calculation has been completed, so this complication disappears as well.

One of the most important criticisms of benchmark programs is that compilers may be able to take advantage of the program structure to speed things up and so make the comparison invalid. The early BASIC benchmarks used to start with a loop:

```
10 FOR X = 1 TO 1000
20 NEXT X
```

and by timing that, it was possible to work out how much time was taken by the looping alone. It could then be filled with more and more complicated calculations to check other times. "Clever" compilers such as Dabs' ABC BASIC compiler can detect that the loop is empty and decide to ignore it completely. Similarly, some compilers will remove constant calculations from a loop. This is good if your program is genuine, as it speeds things up, but it does play havoc with timings.

The upshot of it is that you will probably see further π programs in various magazines, but you needn't worry about them! A

Prolog System X

C.G.Williamson

Why Use Prolog?

For almost any programming language it is true to say that:

Program = Algorithm + Data Structure

With conventional procedural languages such as BASIC, Pascal or 'C', the implementation of both the algorithm and the data structure involves a (usually disproportionate) code overhead. More often than not, more variables will be used for control purposes, than for passing or holding data. Invariably, it is the control code within an algorithm, or the code used to perform data structure housekeeping, that contains bugs.

For Prolog, we can modify the statement above to:

Program = Logic + Control

Prolog provides a language in which it is possible to specify (quite complex) programs, expressed as logic, with little or no control overhead. Data structures may be implied by the logic (rules), or implemented as part of the program, in the form of logical assertions. The main point however, is that the program ought to remain clear and understandable, without being buried by control code.

What is Prolog used for?

If Prolog is as good as I have made it out to be so far, why is it not more widely used? The reason your Archimedes comes with BASIC rather than Prolog as its built in language, is one of application. For performing such tasks as matrix/vector manipulation, or general number crunching, there are far more suitable languages such as BASIC. However, in the field of symbolic computing, where programs deal with non-numerical problems, Prolog is well suited. It has been widely used as an artificial intelligence tool, for natural language applications, mathematical theorem proving and relational databases, to name but a few.

Prolog – An overview

As you may have gathered, one of the main features that makes Prolog different from conventional 'procedural' languages, is the manner in which the algorithm is expressed. With a procedural language, every state change and control decision is defined explicitly by the programmer.

By contrast, Prolog is what is known as a 'declarative' language. At its highest level, Prolog allows programming in formal logic. The programmer determines what rules and facts apply to the problem to be solved, these are then used as the program. The system can be left to worry about state changes and control. To 'run' a program, the user has in effect to interrogate the system. The system searches through its database, checking for the appropriate rules and matching them with the facts it knows about from the program. Once all the appropriate rules and facts have been matched, the system returns a result to the user. The result will be either the solution to the problem posed by the user, or a message informing the user of a failure to compute a solution.

Failure to compute a solution may be due to three different things: that there is insufficient information in the program to allow an answer to be determined; that there is no physical solution possible; an error is present in the rules or facts of the program.

Perhaps this is an appropriate point to wheel out the often (over?) used family tree example.

First come the facts. In this case just a few as an example.

```
married(elizabethSecond, philip).
male(philip).
parent(elizabethSecond, anne).
parent(elizabethSecond, charles).
parent(elizabethSecond, andrew).
male(charles).
male(andrew).
married(charles, dana).
parent(charles, william).
parent(charles, harry).
male(william).
male(harry).

% After the facts come the rules.
% Comment lines start with a '%'
% A person is female if she is
    not male.
```

```
female(X) :- \+(male(X)).

% Marriage is mutual, but only
    one "married" rule is used
    per
% couple. The ';' denotes logical
    OR.

marriedcouple(X, Y) :- married(X,
    Y); married(Y, X).

% Only one "parent" is normally
    needed.
% The other parent is assumed to
    be the other member of the
    couple.

parentof(P, Y) :- parent(P, Y).
parentof(P1, Y) :-
    marriedcouple(P1, P2),
    parent(P2, Y).

% X is the father of Y

father(X, Y) :- parentof(X, Y),
    male(X).

% X is the mother of Y

mother(X, Y) :- parentof(X, Y),
    female(X).

grandfather_of(Gpa, X) :-
    parent(Parent, X),
    father(Gpa, Parent).
```

Many more rules specifying relationships could be added to the program. It ought to be obvious that the use of rules considerably reduces the number of facts that have to be recorded. Rather than giving a detailed explanation of the program, here are a few brief comments.

- Constants start with lower case letters.
- Variables start with upper case letters.
- The head (similar to procedure name declaration) of a rule looks like – ruleheadname(Var1, Var2, ..., VarN) :-
- The body of a rule checks one or more rules separated by a comma for logical AND, or a semicolon for logical OR. Two rule definitions with the same head name may be considered as being separated by a logical OR.
- Once a variable in a rule matches against a rule or fact with a constant in that position, the constant is assigned to the variable.

To use the program, the system may be interrogated as follows. Note that ?- is the interrogate prompt and that the answer is returned on the line below the query.

```
?- grandfather_of(Who, harry).
Who = philip

?- father(philip, andrew).
yes

?- father(charles, Child).
Child = william
more(y/n)? y
Child = harry
```

The system always offers to find alternative solutions.

```
?- father(Dad, harry).
Dad = charles

?- father(Dad, Offspring).
```

The combination of the first answer and all the alternatives would be every father/child pair recorded.

Examples of the three types of failure:

```
?- mother(elizabethSecond,
     edward).
No
```

There is no fact recorded about Edward.

```
?- mother(anne, harry).
No
```

It is not true that Anne is the mother of Harry.

```
?- mother(diana, harry).
No
```

The program contains an error. Charles is recorded as being married to 'Dana', and not 'Diana'.

Bear in mind that the real purpose of the example is to give you an idea of what a Prolog program looks like. One of the most striking things about it is the total lack of loop structures, explicit variable assignments or IF THEN ELSE constructs.

If you have not seen a Prolog program before, I hope the example shows you something of its simplicity. I am quite sure that Prolog provides a much more natural environment to learn to program in, than any procedural language. Anyone who has done a reasonable amount of procedural programming may, however, have difficulty adapting to the rule based style.

Prolog provides a number of features not directly connected with logic. These features include input and output (keyboard, screen and file), integer operators, list handling, and the ability for a program to alter, add to, or delete its own rules. While up to now I have stated that the system looks after its own control, the ordering of the rules does amount to imposing a degree of control flow. In addition to the ordering of the rules, there are a number of built in rules that can be used to affect the control flow of the program.

Prolog System X – An Overview

Acorn claims that System X is compatible with DECsystem-10 Prolog. I have, in the past, used Prolog on a DEC10, an aging medium sized mainframe, favoured at one time by a number of universities. I also still have in my possession a manual for DECsystem-10 Prolog. With this experience and information I will now consider how System X matches up.

The Acorn documentation provides less than adequate details on how to start up the system. My first attempts (after taking a backup copy) did not get past the cryptic message:

```
Uncaught Modula-2 exception -
    User defined
(memory dumped in 'm2dump')
```

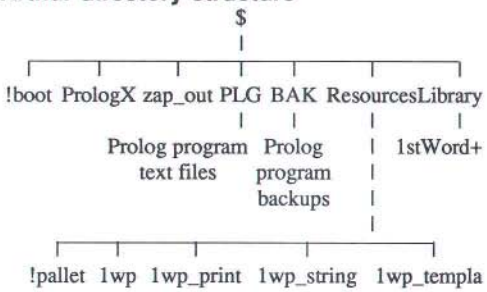
You can imagine my panic as two hundred pounds worth of software failed to pass first base. After a little thinking, I reconfigured the screen size from 40, to 20. A double-check through the documentation revealed no clues about how the machine ought to be configured! After a <ctrl-break>, the system booted up without problems. A banner appeared on the screen listing, amongst other things, the release number, in my case 4.011.

Programs may be consulted (read by the system) from a previously edited file, consulted from the keyboard, or compiled from a previously edited file. As with DECsystem-10 Prolog, there is no way of saving a text version of a program consulted from the keyboard. It is possible to save the system state, which may have been created by consulting from the keyboard. It does seem a pity that no means of retaining the text of a program modified or created in the system, has been implemented (see Ian Mackie's comment Archive 2.7 p12). Any serious program development should be undertaken with an editor of some description. Under Arthur, I set up a disc with the Prolog system on it and, in addition, a cut down version of First Word Plus to be used as a text editor. The boot file for the disc was modified to give the following:

```
10 REM > !boot Prolog System
     under Arthur
20 *FX255,1
30 *Echo "Press F1 for 1st WP, or
     F2 for Prolog"
40 *Set key$1 QUIT M 1stWord+ M
50 *Set key$2 Prolog M
60 *Set alias$Prolog pointer 0 M
     Echo <20> M PrologX zap_out -
     g 30000 -l 10000 -h 40000 -t
     30000
```

For the boot to work, the directory structure shown was implemented.

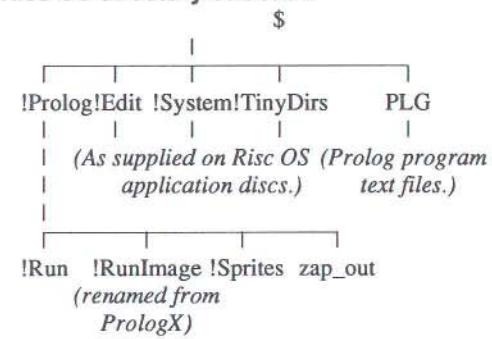
Arthur directory structure



Towards the end of the time I had been allotted to complete this review, my long awaited copy of RISC-OS arrived. This required a completely new strategy. I attempted to have the applications disc editor running on the right hand end of the icon bar and Prolog available from a Tiny Dir on the left hand end. This may well be possible on a 4 Mbyte

machine but there is just not enough room on the A310. In the end, I had to be satisfied with having the editor and Prolog in a Tiny Dir and always making sure that the editor had been quit (removed from the RH end of the icon bar) before running Prolog. To run the system off a single disc the following directory structure is required:

Risc OS directory structure



The !Run file for Prolog should look like:

```
*Echo <22><3>
*Set PlgX$Dir <Obey$Dir>
*Run <PlgX$Dir>.!RunImage
    <PlgX$Dir>.zap_out -g 30000 -
    l 10000 -h 40000 -t 30000
*Echo <22><12>
```

The obey file for the editor requires modifying:

```
| Edit, version "1.00 (20-Dec-
    88)"
|
*Set OldSys$Path <System$Path>
*Set System$Path
    adfs::CWProlog02.$.!System
| Assumes disc name is
    :CWProlog02
*Set OldFont$Prefix <Font$Prefix>
*UnSet Font$Prefix
*WimpSlot -min 160K -max 160K
*IconSprites <Obey$Dir>.!Sprites
*RMEnsure SharedCLibrary 0 RMLoad
    System:modules.CLib
*Set Alias$@RunType_FFF Run
    <Obey$Dir>.!Run %%*0
*Set Edit$Dir <Obey$Dir>
*WimpSlot -min 160k
*Run <Edit$Dir>.!RunImage %*0
*Set Font$Prefix <OldFont$Prefix>
*UnSet OldFont$Prefix
*Set System$Path <OldSys$Path>
*UnSet OldSys$Path
```

It is well worth putting some effort into making the overall system as easy to use as possible. However, you may have to juggle with the configuration of your machine to allow everything to fit in.

Consulting a file allows a number of what Acorn calls debugging features to be used, namely being able to list a program from the system. Compiling removes information that the debugging features require and so no debugging can be undertaken on compiled code. The only advantage gained by compiling on System X, is a saving on space. Compiled programs run no faster than consulted programs. On DECsystem-10, compiled code runs 10 to 20 times faster than consulted programs. As a rough performance guide I implemented a plan generating program on the Acorn system. This program had been previously run on the DEC10. The planning program is non-trivial, though all it was asked to do was return a 'plan' to solve the Towers of Hanoi problem. The planner had two strategies available within it. A breadth first search was implemented, as well as a depth first search. The results, in seconds, were:

	Acorn Sys-X	DECsys-10
Breadth First Strategy	53.81	13.32
Depth First Strategy	27.78	6.73

The Acorn times were obtained running under RISC-OS and the DEC times are for compiled code. For lesser applications, System X ran faster than DECsystem-10, by a margin of a few milliseconds. The results were certainly not what I expected to see when comparing 1970s technology with that from the late 1980s!

Prolog System X – The Details

So much for the generalities. I will now consider some of the key areas looked at and the problems encountered.

No debugging facilities

'Programming in Prolog' by Clocksin and Mellish, published by Springer-Verlag, is usually considered to be the standard reference work. It is

now in its third edition and is priced at around £20. Anyone considering having a go at writing Prolog programs would be well advised to have a copy of the book.

A whole chapter of Programming in Prolog is devoted to debugging and, in particular, those built-in debugging facilities of a Prolog system that allow you to observe rules being matched by the system. DECsystem-10 has a similar chapter in its manual and implements the facilities referred to in the Clocksin and Mellish book. It was therefore with total disbelief that I searched through the Acorn manual without finding any details of these debugging features.

What Acorn did have to say, in a section of the manual entitled 'Features Specific to Archimedes Prolog', was 'Some relevant deviations from normal practice' ... 'debugging facilities are not built in' ... 'However, it is possible to use an interpretive debugger (available from the Prolog library)'. There is no mention in the manual of what or where the Prolog library is (one presumes a collection of Prolog programs in the public domain), and why have Acorn not provided it? I believe that the provision of debugging facilities is fundamental to anyone learning to use the language successfully. At the price being charged and considering that debugging facilities are normally considered to be a standard part of a Prolog system, Acorn have no excuse for such a major omission. The less expensive Acorn Micro-Prolog for the BBC, included these features. I feel that most users would consider that the lack of debugging facilities constitutes a major reason for not purchasing the system.

No stand alone application generation

Earlier in this review, I suggested that the choice of language to be used to solve a problem would depend upon the nature of the problem. You could envisage a large system where symbolic processing was performed by Prolog and a graphics display, driven by the symbolic processing, was written in 'C', for instance. The DECsystem-10 Prolog allows code to be prepared and stored in a file in such a way that it can be run from, say, the operating system, rather than having to be run from within Prolog.

While the Acorn manual refers to modules, these are not of the Arthur/RISC-OS type but rather a new feature of the Prolog language. No mention is made in the System X documentation as to how Prolog code might eventually be run independently. The Acorn copyright appears to preclude software developers from being able to use Prolog in a wider system. One is left wondering just what Acorn intend it to be used for? I imagine that many users are going to find the system of little use unless they are intending to run it in isolation.

Other areas covered

Now for some less fundamental problems. I will quickly go through the bugs and features that have cropped up during my first six weeks of using the system.

- The built in statistics clause is incorrectly documented – the time and goals arguments are crossed over. In a similar vein, nowhere does the documentation mention the (<goals>/<time>) returned after each interrogation.

- Error handling is incorrectly documented. The manual suggests that if you do not wish to retype input after making a syntax error, you should type a full stop. Following this advice appears to have no effect. Typing an exclamation mark, followed by a full stop, however, does return you to the prompt. Errors at run time have a nasty habit of causing the Prolog system to be quit, having first printed a meaningless (error?) message.

- Another problem encountered involved a clause of the form:

```
map([PL]) :- P, map(L).
```

The head 'P', of the list that forms the single argument of the clause head 'map', would always be a partially instantiated unit clause. This partially instantiated unit clause is then the goal 'P' in the body of the clause. Goal 'P' in the body of the clause should match against assertions made in the program. In other words, the partially instantiated unit clause matches an assertion and in the process becomes completely instantiated. (I hope that anyone who might be affected by this problem understood that! If you don't understand, it probably does not affect you. If you have not given up yet and turned to Paul's article on the relationship between BASIC V and quantum mechanics, back to the problem.) Given all of the

above, the clause succeeds on DECsystem-10, but fails on System X. To cure the failure, rewrite the clause in the following form.

```
map([PL]) :- clause(P, true),
     map(L).
```

• The only other problem I have encountered was with what might be termed 'conventional assignment'. In BASIC, we might have an assignment statement such as:

```
Result = Result + SomeNumber
```

A direct conversion to Prolog gives:

```
Result is Result + SomeNumber.
```

Given that both Result and SomeNumber are instantiated prior to the attempt to evaluate, System X fails on the evaluation. The Acorn manual and 'Programming in Prolog' both suggest that the evaluation should succeed. Within the strictest rules of Prolog I am not sure which result is correct. A simple solution is to always ensure that clauses are arranged to suit the form:

```
Result is OldResult + SomeNumber
```

In any case, I feel this is better Prolog style.

Conclusions – Experience To Date

By and large, the system is very easy to use. Acorn appear to have implemented, with the exception of the lack of debugging facilities, a complete Prolog system. A number of enhancements have been provided, beyond those normally found in such a system. In the time I have had System X, I have run most of the material in the Clocksin and Mellish book on it. No major problems were encountered in doing so. Documentation for Acorn Prolog consists of a sparsely printed, but otherwise adequate 66 page manual. DECsystem-10 provides a far superior 96 page machine readable document.

At the end of the day, it has to be said that System X is not worth the price that Acorn are asking for it. Up to a point, the system can only be described as 'ordinary'. In fact the most outstanding feature of the system is a glaring omission. The nature of Prolog requires it to have built-in debugging facilities. In this case they are not provided. I feel that the other failure of the system is the inability to generate stand-alone code. Compared against the other (over-priced?) languages, 'C' and Pascal, Prolog System X provides less, for twice the price. Acorn never seem to get their product marketing quite right. Prolog is one such example. A

(Oh, dear, I bought a copy of Prolog System X for stock – but after this review, it looks as if, at £199, I'm not going to sell it. Anyone want to make me an offer for it? Ed.)

Matters Arising

• **Bug in YAIG** – There is a bug in the shareware game YAIG (Shareware disc Nº8). The check for whether a sprite is only partly onscreen fails because of a silly mistake.

Load the BASIC program YAIG_BAS and find the following section.

```
CMN xR,#antall_xR
MOVLE R15,R14
CMN yR,#antall_yR
```

Remove the two hashes, and save YAIG_BAS.

• **The BASIC Compiler war continues.** So far, Mach Technology's offering which is said to be "the fastest compiler on the market" has not yet appeared, so we can't substantiate their claim, but after seeing our review of RiscBASIC in last month's issue, Paul Fellows, author of Dabs Press' offering, ABC, wrote in to Archive as follows...

Dear Sir

I have just read the article about BASIC compilers by Brian Cowan in the June issue of Archive and I am rather disappointed with it for three reasons.

1. No mention is made of the fact that ABC (v2) can be installed on the icon-bar of the RISC-OS desktop with full file-dragging operation. In view of the speed with which users are upgrading to RISC-OS, this would seem to be a rather important issue. RiscBASIC is an "Arthur" application and provides no such facilities.

2. In quoting benchmark times, Dr. Cowan has fallen into the trap of not comparing like with like.

All the timings given, assume that the RiscBASIC "Turbo" directive has been used. However, no use is made of the analogous directives provided by ABC. Surely it is only fair to do the timings either "with all relevant directives" or "with no directives"! To illustrate my point I have prepared the following short table:

	RiscBASIC (v1.70)	ABC (v2.29)	
With Directives			
For loop	*1.34*	*0.00*	*(*)*
Ack(3,4)	*0.14*	*0.07*	
IntMath	*0.16*	*0.18*	
Without Directives			
For loop	*9.92*	*3.09*	
Ack(3,4)	*0.24*	*0.16*	
Intmath	*0.24*	*0.30*	

(*) Empty loop eliminated by ABC

3. The review stated in passing that the benchmarks are not necessarily representative of the real performance of the system. This I would agree with. Nevertheless, the review concludes that RiscBASIC is faster in all areas only on the basis of these very simple tests. In fact, as program complexity increases, things swing very much in ABC's favour. As an example, I have chosen a program which sorts strings in a string array. This is representative of a general class of CPU intensive tasks.

StringSort :	*RiscBASIC (v1.70)*	*ABC (v2.29)*	*Basic V (1.04)*
With Directives	*114.6*	*1.96*	*24.01*
No Directives	*117.2*	*2.72*	*24.01*

Note that RiscBASIC is out-performed not only by ABC but also by the interpreter. In my experience, this is not an isolated example; it heralds a general trend which is a direct consequence of the architecture of RiscBASIC's runtime system.

Obviously, I am biased towards my own product, but anyone wishing to verify the facts about ABC which I have given here, can do so at no cost since DABS Press will be happy to supply a free demonstration copy of ABC complete with these example programs.

Yours, Paul Fellows

Has anyone tried compiling large BASIC programs with either compiler? One reader has tried one of them and said that his long programs would either not compile at all or, if they did apparently compile, they wouldn't run properly. The author of the other compiler has sent him a copy of his compiler and we will let you know the result of that test. A

Readers' Comments

• **Unwanted duplicates in GammaPlot** – The package seemed to work fine, though the copy protection was an irritation. As my project progressed, it became highly convenient to use the skeleton of one of my old graphs and change it to produce the next graph. This involved altering, inserting and deleting entries in the on-screen data list which GammaPlot uses for constructing graphs.

Here a remarkable 'feature' of GammaPlot appeared: unwanted duplicates of the latest data entered, popped up lower down the on-screen list. Deleting the spurious entry low in the list also knocked out the entry at the top of the list. Minerva eventually sent a version 2.00 for RISC-OS which they hoped would solve my problem. I could easily reproduce the same feature in version 2.00 and gave up, got a refund and have now been working with GraphBox which does the jobs I need, with one one minor problem so far. It took courage to buy GraphBox." Mike Sherratt.

• **ArcWriter** – If anybody out there still hasn't got a replacement for ArcWriter, you may be interested in the comments of somebody who has actually used it a bit rather than just giving up in despair.

When I first tried ArcWriter I was disappointed too, but I have since used it in anger, and successfully created documents up to 70 pages. I accept some of the criticisms which have been levelled against it, but I think some of the reviews it got were rather unfair, particularly Acorn User which gave it 0 out of 10. If you are prepared to persevere with it a little longer (assuming you haven't already traded it in for First Word Plus) here are a few tips which may make life easier.

• OK, the program's not very robust, but it behaves better if you use the function keys rather than the pop-up menus. I know WIMPS are "in" at the moment but, personally, I find the mouse a bit of a nuisance with a keyboard-orientated application like word-processing. You have to keep leaving the keyboard to use the mouse and then returning when you're finished – it breaks the continuity of typing. Menus are very pretty and great fun when you're learning, but function keys are faster once you've got the hang of it.

• Speed. You'll probably have noticed the way ArcWriter gradually slows down as you type in new text, and after three pages or so it lags so badly as to be almost unusable. I've found a fix for this. Move to the other end of the file, insert a character and delete it, then return to where you were. You'll find the response is now normal again, although you'll have to repeat the process every few pages. I suspect this strange behaviour is caused by ArcWriter not keeping the document as a single block, but instead creating a buffer for the area you're working in. As this fills up, the response slows down. Moving to another place and back makes a new buffer. Idiosyncratic, yes, but don't knock it – it works.

• Space. The manual says about 30 pages of A4 on an A310; my estimate is about 40. I find it hard to understand how a 132k program can leave only 100k of workspace on a 1Mb machine, but that's it. The simplest way of getting more space is to configure the screensize to 10, since that's all ArcWriter needs. This doubles the workspace, giving enough space for 80-90 pages of A4. You should note that if you load a short file after working on a longer one, ArcWriter doesn't release the freed space and you can hit problems if you extend the new file much. The fix is, I'm afraid, quit and re-enter.

• Bear in mind when making comparisons with other wordprocessors that ArcWriter is the **only** 100% wysiwyg program available. I borrowed a demo copy of First Word Plus from my local dealer, expecting to be bowled over by this wonder program, only to find that it can't show the difference between pica, elite and expanded text on screen, it doesn't centre text as you type, in fact it's very View-like in many ways. I admit it's very slick and the spelling checker is nice, but ArcWriter is free. I hope all this doesn't sound biased (well, not too biased anyway). If you can be aware of ArcWriter's limitations and learn to work within them, I think you'll find it a very useful and under-estimated program. Lorcan Morgey, Belfast.

• **Hard Disk Specifications** – If you have been thinking of purchasing a hard disk system for your Archimedes then you may be baffled by the plethora of specifications hurled at you.

The figures most often quoted regarding hard disks are speed and size, but how relevant are these? Two 40Mb drives may appear on the outside to be the same but what are the real differences and how do these relate to their actual performance?

The average positioning time is often given as being the only factor in determining drive speed but this is not the case when there are physical differences. A 28ms drive may in fact give a poorer performance than a 35ms drive if the internal construction is different. Drives may have various numbers of heads (4 to 8) but what difference does this make? A hard disk which has 8 heads can read twice as much information without moving the heads as a drive with 4 heads can. Thus the actual load/save speed of a drive is based on both the average access time and the number of disk heads.

For example, it takes 17ms to read one 8k track on any drive. To load a 512k file on a 28ms drive with 4 heads takes 28ms to find the first cylinder plus 68ms to read each of the sixteen 32k cylinders plus fifteen 7ms track to track times giving a total of 1.221s (419kB/s). To load the same 512k file from a 35ms drive with 8 heads will take 35ms to find the first cylinder plus 136ms to read each of the eight 64k cylinders and seven 7ms track to track times giving 1.172s (436kB/s).

The important factor which determines the access time is the type of actuator used. The two main types are; a Voice Coil (like a solenoid) which has an access time, typically, of less than 40ms and a stepper motor which is more like 68ms. The maximum (as opposed to average) access time for a voice coil drive should be about 75ms which is not simply equal to the number of cylinders times the track to track time. Drives which have average access times which vary between 28 and 40ms will

actually have track to track times which vary by less than 1ms (i.e. between 7 and 8ms).

There are many figures that manufacturers can tell you in order to make their product appear more attractive including those mentioned above but also important are, position of parking cylinder, power consumption, noise, vibration, susceptibility to shock and, most importantly, reliability.

The position of the parking cylinder in relation to the last cylinder is important in order to reduce the risk of data corruption if the drive is badly knocked while parked. Ideally it should be well away from the last data track.

It will be found that with a high quality drive, the number of data errors and the number of positioning seek errors will be greatly reduced. These errors can increase the actual access time beyond the quoted access time without the operator realising.

The following table list some of the details of popular drives.

Manufacturer	sect -ors	hds	cyls	pre- comp	park cyl	ave access
20Mb West. Dig.	32	4	615	No	663	28? ms
20Mb Miniscribe	32	4	615	Yes	663	68 ms
40Mb Fujitsu	32	8	615	No	664	35 ms
53Mb Rodime	32	7	872	Yes	871	28 ms

Write pre-compensation is used on older drive types but is now not normally required.

When purchasing a hard disk you must consider the cost against the performance which you will get and the confidence that you will have in the security of your data.

Where does that leave those who are trying to buy a hard drive for their Archimedes? What we need to do is get someone to prepare a standard set of tests for hard disc speed and then various folk can run them on actual hard drives from the different suppliers. This needs a co-operative effort. Any offers, anyone? Ed. A

Computerware Hard Drives cont'd.

David Leckie

The original review Archive 2.9 p54 finished with the following criticisms: (1) Their hard disk backup program has not yet appeared. (2) The problem with the hard disk podule, RISC-OS and the I/O podule has still to be resolved. (3) The PSU cable problem.

Backup Program – This has still not appeared apparently there are still bugs in it!

PSU Cable – They have now supplied a short extension cable.

RISC-OS – When the original review was written RISC-OS was still several months away from general release. Well in mid April RISC-OS arrived, was fitted and quickly removed again as the hard disk refused to work, giving a disk error every time the disk was mounted. (All other podules were also removed just in case, but to no effect)

I had another battle with Computerware's answering machine and then they phoned back saying that a modification was required and if I returned the podule this would be done by return of post.

Ten days later a new podule arrived, RISC-OS and the new podule were fitted and... yes, you guessed it, nothing worked – not even a disk error. This time, the machine just hung when the disk was mounted.

This podule was back in the post within a couple of hours along with a strong letter. Within the week a replacement arrived, was fitted and... everything worked perfectly. Fitting the I/O podule and an Econet card had no ill effects, a quick verification of the disk showed no errors. I was thankful – this had been a source of worry because the heads could not be parked after the previous problem arose.

Conclusion

Now that all the technical problems have been overcome, the Computerware hard disk system is a superb product. I believe they are still having production problems making delivery slow, but N.C.S. don't cash the cheque until goods are ready.

Prospective buyers of a hard disk system for the Archimedes should remember that price is not everything: there may be cheaper alternatives available, but these may be slower drives and, while PC's may not benefit much by using fast drives, the Archimedes does.

Computerware offer an extremely fast, 40 Mbyte internal hard disk that supports a second external drive. Does any other company offer all three? They are an honest company, if a bit disorganised. Provided that they sort out their production problems and get a human being at the end of the phone then I can unreservedly recommend their product. A

For more info on the I/O problem, see Mike Harrison's comments on page 55. You will be pleased to hear that Computerware have now moved into permanent office accommodation in Norwich. This will mean an end to the 24-hour, 7-days-a-week ansaphone problem. You can now ring them during office hours on 0603–507799. The supply of podules is still a bit slow though. It's apparently a problem with getting the disc controller chips. They are due to get some more about the second week of July, so if you are still waiting for yours, please be patient, they're working on it! Ed.

Windows, Icons, Mouse and Pointer

Gerald Fitton

RISC-OS is a WIMPs environment. WIMP is an acronym. It stands for Windows, Icons, Mouse and Pointer. The operation of windows is a substantial topic and, since they can only be used by making SYS calls to the operating system, this makes it difficult for the beginner. This is particularly so since the documentation for SYS calls is not included with the machine but available separately in the Programmers Reference Manual (PRM). (The RISC-OS version of the PRM is not yet available!)

This month, I shall avoid the topic of windows but, in response to many letters, I shall concentrate on the Icons, Mouse and Pointer aspects of the WIMPs environment. To illustrate this, I shall describe in detail, with an extended example, how to set up an Application Directory for a WIMPs based program. Since the series is partly intended for beginners we'll start with an unformatted disc, format it from DeskTop and (important when using RISC-OS) give it a name.

Getting started – Formatting

If you are not in DeskTop then type in *Desktop <return>. Put an unformatted disc in drive :0 and then click the menu (centre) button of the mouse over the :0 icon. You will be presented with a menu headed "ADFS::0" which includes the option "Format". Run the pointer through the word "Format" to the arrow at its right hand end. A sub-menu opens; click the select (left) button on the "E" format. You will be asked for confirmation; click select once more.

Naming the disc

If all goes well, your next important step is to name the disc. RISC-OS keeps track of all applications and utilities by remembering the full path name of the file; this path name includes the name of the disc. If a RISC-OS application needs a file which is on a disc not currently in the machine, it will ask you to insert that disc referring to it by name.

To name your disc as "WimpSys" from the DeskTop environment, click the menu button over the :0 icon and run the pointer through "Name disc"; type in the single word "WimpSys" and press <return>. If you now select the :0 icon, you should find that a directory window opens on the screen showing the full pathname of the directory to be "adfs::WimpSys.$". There was a mistake in Archive about a couple of issues ago due to a misunderstanding between the Editor and myself. I asked Paul to enter the Archive monthly disc name into my script, Paul used the disc title instead of the disc name. To clarify the difference for those more used to the BASIC or System environment, *(i.e. dummies like me! Ed.)* the disc title is created with the *Title command (and the string can be many words) but the disc name is created with *Namedisc and it has to be a single word.

Creating an application directory

From the DeskTop, with the pointer within your "adfs::WimpSys.$" directory window, click <menu>. A menu headed "Filer" will open; run the pointer through "New directory" and type in the word "!WimpSys". You have now created a new directory called "!WimpSys". A directory with a name that starts with a "!" is called an "Application Directory" and (when we have written it) the application can be started up by double clicking on the application directory icon.

To "open" an application directory (to see what files are contained within it) you have to double click <select> with the pointer on the icon whilst holding down <shift>. Do this and you will find that "adfs::WimpSys.$.!WimpSys" is empty. At the moment, the application directory icon is the RISC-OS default application icon. It isn't a descriptive icon like those of !Paint, !Edit or !Draw and the way to overcome this deficiency is to make your own.

Making your own application icon

Find the disc containing Acorn's "!Paint" application. Put it in drive :0 and select the ":0" icon. Double click on the "!Paint" application icon and "!Paint" will be installed on the icon bar at the bottom of your screen. Now select this (installed) icon and you will find that a window opens on the screen called <untitled> and below it the words "Sprite file window". Place the pointer within this window and click the menu button to open a menu headed Paint. One of the options of this menu is "Create" which you can use to create your own application icon. Run the pointer through "Create" and a sub-menu opens into which you can type the sprite name "!WimpSys" (i.e. the same as the name of the application directory). You will see the default width is 100 pixels and the default height is 50. Change these numbers to 34 and 17 pixels respectively (this is about the right size for an icon) and click select on the "mask" icon. There is no need to click on the "palette" icon because we shall use the default DeskTop colours. Finally, click on the "OK" button and you should find yourself with a sprite in the "Sprite file window" called "!WimpSys".

Double click on this "!WimpSys" sprite and yet another window will open this time headed "!wimpsys" (sprites have lower case names). Use the menu button from inside this window and a menu called "Sprite" will open. Run the pointer through "Zoom" to open a "Magnifier" sub-menu. Use this sub-menu to change the magnification to 8:1. You can either type in the 8 and 1 or you can click <select> on the left upper arrow to increase the magnification. Put the pointer back into the "!wimpsys" window, click <menu> again and then run the pointer through the "Paint" option to open a sub-menu headed "Paint". Click on "Show Colours" with the adjust (right) button (this avoids closing the window) and the "Show Tools" option with <select>.

I like to have the "Paint Tools" window at the top right of the screen with the "Colours" just below the "Paint Tools". You can move the "Tools" window around the screen by placing the pointer on the word "Tools", pressing and holding down <select> whilst moving the pointer to the top right of the screen. When you release <select>, the "Tools" window is relocated. This process of holding down a button and moving the pointer is called "dragging". (With some applications, you should try dragging with <adjust> rather than <select>; it sometimes has a different effect.)

For the application icon on the Archive monthly disc I have chosen to draw three concentric circles with a few vertical and horizontal lines and filling the quadrants with colour. This is meant to look like a leaded light window! When you have a reasonable picture, as the last operation, use the Replace Colour tool to make the background (the outside of the sprite) transparent. If it is not open already you should open the "adfs::WimpSys.$.!WimpSys" directory by double clicking on the "!WimpSys" directory icon with <shift> held down. With this directory open on screen and with the pointer in the Sprite file window, click <menu> to get the Paint menu. Run the pointer through the Save option to open the "Save as" sub-menu, type in the file name as !Sprites and then pick up (hold down <select>) and drag the icon (which shows part of a house and a paint brush) into the !WimpSys directory.

The screen dump shows a (monochrome) version of the screen just after this last operation (but you won't have the !Boot and !Run files yet). For those of you who get the monthly disc, you will find this screen dump saved as a sprite called "Stage1". An alternative way for authors of programs to include sprites in the magazine listings is given at the end of the article.

The !Boot and !Run files

To create these files, you need Acorn's !Edit application. Put the disc containing this application in the drive, select the :0 icon and then install the application !Edit by double clicking on the !Edit icon. Now place the pointer over the !Edit icon

which appears on the icon bar and click <menu>. Choose "Create" followed by selecting "New Obey file". When the text window opens type in:

```
Set WimpSys$Dir <Obey$Dir>
IconSprites <Obey$Dir>.!Sprites
```

With the pointer within this text window, press <menu> to open the Edit window, choose the Save option, type in the filename !Boot and drag the save icon into your "!WimpSys" directory just as you did with !Sprites.

RISC-OS recognises application directories because the first character of its name is a "!" and treats them in a special way. When you click on the :0 icon, all application directories are opened and the !Boot files found within those application directories are all run.

The commands "Set" and "IconSprites" are operating system commands. The first, "Set", makes our own private system variable <WimpSys$Dir> equal to the current value of <Obey$Dir> which, in turn, is the full path name of the directory containing the Obey file running at the time (i.e. our !Boot file). This full path name includes the name of the disc and that's why it is important to name the disc. In our case the full path name is "adfs::WimpSys.$.!WimpSys". So, simply clicking on the :0 icon will run our !Boot file and assign "adfs::WimpSys.$.!WimpSys" to our own private system variable <WimpSys$Dir>.

The second OS command, "IconSprites", finds a sprite from within the !Sprites file called by the same name as the application directory (i.e. !WimpSys but in lower case) and uses this sprite as the application icon. The effect of the second line of our !Boot file is to display our own application icon in the "adfs::WimpSys.$" directory window.

The !Run Obey file is created the same way and is:

```
Set WimpSys$Dir <Obey$Dir>
WimpSlot -min 16k -max 16k
Run <WimpSys$Dir>.Window00
```

The WimpSlot OS command is used by the task manager to allocate memory to the application. All applications have a minimum requirement, some (such as databases) are improved if more memory is made available. The final command, "Run", loads and runs the application program. Although there is a program called "Window01" on the monthly disc, this could be any program or application. For simplicity try the BASIC program:

```
10 REM > <WimpSys$Dir>.Window00
20 MODE 12
30 PRINT "Press any key to
    continue."
40 wait$=GET$
50 END
```

Notice that our private system variable <WimpSys$Dir> is used as part of the path name both in the !Run Obey file and as part of the BASIC program name as it appears at line 10. Doing this allows you to copy the whole !WimpSys directory and its contents to any disc and to run the application without alteration. This program is not a multi tasking program so it will take over the whole screen and stop all other applications running. To get it to co-operatively multi-task is quite a complicated business. You have to include many Wimp SYS calls and that's another story.

Conclusion (mainly for programmers)

What I have tried to do this month is to show you how use the Icons, Mouse and Pointer part of the WIMP DeskTop environment. You have learned to use it to format and name a disc and to set up an application directory. What is perhaps more important for the future is that you have done this without entering either the BASIC or System environments. I believe that it is not only Acorn that are moving in this direction. By now, you earlier purchasers should all have converted to RISC-OS and Arthur should be a fading memory. There will be an increasing number of new purchasers who will never use the BASIC or System environment and we programmers must learn how to cater for them. One of the problems which arises from the strongly visual nature of the WIMPs environment is that programmers have to find some way of including sprite and template files as a magazine listing. In the Appendix of this article I show one way of tackling this problem namely, including DATA statements in a BASIC program.

Appendix: Sprites and Templates as a Magazine Listing

How do you show a sprite or window template as a magazine listing? First, why bother? For those readers who buy the monthly disc there is no

problem, there is a data file called "!Sprites" or "Templates". For programmers wishing to include say an application icon or window template in an Archive program they don't want to have to do a lot of work when they have a utility for creating the data file. I know there are many ways around this problem. Here is one that authors writing for Archive might like to follow.

The solution

The program "ReadData" uses, as a source file, a data file such as a sprite or window template. When RUN, the program creates a dumpfile which contains BASIC line numbers, the BASIC instruction "DATA" and four (32 bit) numbers per line. The programmer, having made a template file with Acorn's "FormEd" or Adrian Look's disc, can change lines 1050 and 1060 of this program to match their data file and RUN this program. The next step is to LOAD the program "MakeFile" and *EXEC the dumpfile as indicated at line 1050. Change lines 1070 and 1080 to match the application and save the extended file. This extended "MakeFile" program is then listed in the magazine.

The reader types in the extended "MakeFile" program and when it is RUN the sprite or template file is recreated. This makes less work for the programmer whilst still giving the reader the option of typing in the data from the listing or buying the monthly disc.

The two BASIC programs "ReadData" and "MakeFile" can be found in the !WimpSys directory and have been tested on the files "!Sprites" and "Templates". The two extended "MakeFile" programs are called "MakeSprite" and "MakeTemp" respectively. A

Realtime Solids Modeller

Richard Offer

The large package contains a single disc and an A5 manual of 149 pages. The disc, selling at £89.95 inc VAT, in fact contains two separate programs, SolidCAD (the design package) and The Realtime Graphics Language (for animating the designed models). SolidCAD can be purchased on its own for £49.95 and upgraded to the full package for the difference in price.

On booting the disc, SolidCAD is loaded and presents the user with four views on the screen. These comprise of plan, front and side elevations in 2D and a projection view in 3D, with the views arranged in 3rd angle projection (1st angle is available as an option). Beneath the views is a two line command line display and at the right, the menu section. The main menu consists of the options Edit, Panel, Style, Tools, Load and Macro. On selecting one of these, a second menu is displayed below the main one.

SolidCAD is largely menu-controlled using the mouse, but it will also accept both single key presses (to set switches) and commands typed in at the command line. This latter feature allows an ASCII file containing such commands to be 'Exec'ed in.

All 3D design systems are notoriously difficult to use until the relationship between the views is familiar to the user. SolidCAD makes this initial phase somewhat easier for those with experience of 2D drawing, since the objects are defined in one of the three 2D views. The four views are continuously updated, immediately reflecting in all windows any changes made, each can also be zoomed to full screen size if required.

Creating the objects

There are two basic methods of defining a solid model, storing a number of basic shapes within the program that are scaled when required (known as Constructive Solid Geometry or CSG) or by defining each face of an object by connecting lines (Boundary Representation or B-rep). SolidCAD uses the latter method, where each face is drawn in one of the 2D views using the mouse. As an aid, snap to a point is available, as well as closing an object with a single key press. In addition, a solid can be built by extruding or sweeping an outline, for example extruding a square will produces cube whereas sweeping it gives a cylinder.

The style menu

The style menu gives the user control over the appearance of the object in the projection viewpoint

(the model is always shown in wireframe in the three design windows). The default is using wireframe, but additional options include removing the hidden detail, and a series under the convex/ concave names. A smooth shading option is available, which produces a multi-coloured display in 16 colour modes and can be changed in the style menu to use shades of grey or even 256 colours. Blue, red, green and yellow are also available as single colour shades from the keyboard and SolidCAD will support a multisync giving up to 640 x 512 in 256 colours.

Macros

A macro is a special type of file that can be merged into the current model. The scale, position and rotation can all be entered before final merging takes place. This allows a complete model to be defined using separate building blocks, each of which can be re-scaled and saved independently of the others. An added advantage with this method is that the same basic building blocks can be used in more than one model.

Tools

In addition to the extrude and sweep options already covered, this menu also contains the filing commands. The model can be save in four formats, for SolidCAD use, as a sprite for use in art packages, as a macro and as a plotfile. A file saved in plotfile format can be used as the input into Silicon Vision's Super-Dump and Super-Plot packages for output to dot matrix or Graphtec and HP compatible plotters respectively. The Plotmate range of plotters can read plotfile format files directly so a short utility is supplied to send the file to the plotter.

The Realtime Graphics Language

The Realtime Graphics Language (RGL) is a module giving over 40 additional SYS calls that can be accessed from BASIC (or any language that has an equivalent e.g. SWI in assembler).

The calls allow the programmer to select the viewpoint and style of the display. These can be modified within a program to animate the display. Multiple object animation can be performed but this must be allowed for when designing the model, by tagging each of the objects that is required to be animated independently.

Four demonstration programs are included illustrating a number of the calls. In particular, the use of screen buffering to reduce flicker is shown. The programs are well documented and easy to modify to produce some interesting effects.

Documentation

Any CAD software requires a lot of practice to get the best out of it. This is particularly true of 3D CAD packages where the concept of drawing in three dimensions can be difficult to learn. The new 149 page A5 manual for SolidCAD is extremely good, with a number of examples running throughout the manual. The section dealing with the RGL is rather short with only a short description of each command. In addition, a number of README files are included on the disc detailing the latest information on the software. These can be read within SolidCAD and are conveniently one screen in length.

Conclusion

SolidCAD is a classic example of a pure B-rep based solid modeller providing good editing facilities of the objects and poor manipulation of an object (adding or subtracting multiple objects). It might be expected for a modeller in this price range to use CSG which is much less demanding of hardware though inflexible in use. *(Silicon Vision say that it is unfair to compare it with CSG systems since the cheapest CSG on an IBM PC costs £2,500. Ed.)* However, SolidCAD cannot model curved objects other than those produced by sweeping or rotating regular objects, and an ability to subtract a macro from an object would aid complex model building.

The RGL is a powerful piece of software, if at first a little daunting, but it is worth sticking with as the results can be very pleasing. It is, however, a programmer's tool, providing flexibility but requiring the user to do all the work. The choice of whether to buy the RGL depends on your approach to animation. If you want flexibility and use a step by step method of animation and don't mind writing programs, then this is the package for you. If however you want a more interactive approach with no programming requirement why not take a look at Silicon Vision's Film-Maker package? A

(Film-Maker is now in stock. Ed.)

Plague Planet by Alpine Software

Richard Forster

The story so far... Following the invention of the McPherson hyperdrive in 2084, the Terran empire expanded rapidly to include all the habitable planets in star systems for which the jump-off points had been found. Over the next 200 years an extensive trading network was established with large Starships carrying colonists and supplies between the planets. A power struggle within the Imperial Council led inevitably to the 20 years Space War which left the star fleets of both sides in ruins and resulted in the isolation of the outlying colonies.

Many of these colony planets, cut off from Earth for several centuries, and having forgotten their former origins, reverted to primitive cultures. Eventually a stable democracy developed again on Rigel IV, an Earth-like planet orbiting a hot, white star 900 light years from Sol. After the rediscovery of the plans for the McPherson drive in old records on an underground computer complex, the Rigellian Grand Council began to construct a fleet of small interplanetary ships. Sending out emissaries and agents, they began the mission of reconstructing the Empire. This is the story of one of those missions".

This is where you come in

You start of the game a simple worker, low down in the social sphere in the city of Krik (named after a certain starship captain.) By opening the door to a spaceship which crashes in the field where you are working, you release a deadly virus onto your home planet. The adventure is concerned with your travels between planets, in an attempt to gain ingredients for the cure.

The puzzles range from hard to downright nasty. If you are into hacking, you will sail past one of the first problems concerning a computer. If you have never participated in this debatable pastime you are likely to be stuck for quite a while. There are some puzzles which seem to have ancient origins, but most of them seem to be original. It's also nice to see a large amount requiring lateral thinking.

A really good game

It is always a shame when an excellent game manages to hide itself. Believe it or not, 'Plague Planet' was one, if not the first, of the few Archimedes adventure games available. The fact it has gone unnoticed for so long is probably due to it being written by a small company . . . and murphy's law.

The game may not outwardly be as impressive as some Archimedes games, having no graphics (except for the loading screen), but the quality of the adventure is impressive. The game has a large number of puzzles, crammed into its 250 locations, each logical. Unlike many adventures the puzzle actually gets progressively harder without having very easy puzzles, or any impossible ones.

It has several nice features you do not see on all adventures. It runs totally from memory, so there is no annoying pause as the game loads whenever you move. You can define function keys, and these definitions can automatically be saved along with the user definable palette.

Screen presentation?

The screen display is attractive and, at the bottom, there are 26 icons for the most frequently used commands. Input as well as being by the keyboard can be via the mouse. You just point it at the required word and press select. The parser used is not bad either. While not quite up to Magnetic Scrolls (but then whose parser is?) it can easily handle long phrases. Life has come a long way since the days of verb noun input, but it is nice to know you can resort to it if need be. It did trip up on some occasions, but most of the time is worked extremely well.

The plot is slightly clichéd, but holds together very well. You can feel the influence of almost every sci-fi favourite creeping in all over the place. In all cases, they cope quite amicably with the other scenery. What's more, the puzzles relate consistently well with the plot. Star Trek & Hitch Hikers Guide fans watch out!

Packaging?

The packaging with all Alpine Software is good, and this adventure is no exception. The game comes in a sturdy box displaying their logo in glorious blue and white. Within the box you find a disc and clear loading instructions.

A hint sheet is available on request and is extremely comprehensive. The hints are well organized and are gradual, although I would advise holding yourself back before acquiring it. It is just too easy to look up a hint whenever you come to a puzzle without even trying it!

Value for money?

The game is excellent value at only £11.95 (inc. p&p – or £11 through Archive). When you consider the cost of other Archimedes adventure games (£25 – £30) it looks even better value.

Other Alpine offerings?

Alpine Software will soon be releasing another adventure game called Cops, a spoof of the popular series 'Hill Street Blues.' Better still an improved version of ALPS (their adventure language) will also soon be available.

At present there is a specially re-coded version which will run under the 6502 emulator. It is virtually the same as the original BBC version though it does have extra text memory. The native version may possibly be available when you are reading this.

If you are keen to have ALPS running on your Archimedes without waiting the emulator version is available for £28.95. There will then be an upgrade cost to get the full version. Whilst on the subject of upgrades, existing owners of BBC ALPS can upgrade to the emulator version for £10. There will be an upgrade to the full version when it becomes available. A

BASIC V Version 1.04 Changes

Martyn Lovell

The BASIC module supplied with RISC-OS has a number of changes from that supplied with Arthur 1.2. This article describes most of these changes and gives some examples of their use.

OVERLAY statement

Syntax: OVERLAY <String Array Specifier>

This statement allows a program to be split into sections, only one of which can be in use at any time. When the statement execute,s the Array should contain a number of filenames of procedure/ function libraries. Enough memory is then reserved for the largest of these, though none are actually loaded. When a procedure is called that is not in the program or in any LIBRARYs or INSTALLed libraries, then each of the overlay files is searched in turn. A procedure in an overlay cannot call a procedure in any other overlay, even indirectly.

It is possible to use more than one OVERLAY statement in a program but the memory allocated by the first statement will be lost permanently. It is also possible to add overlays to the list later in the program but none of these overlays may be larger than the largest of the ones that was in the array when the OVERLAY statement was executed.

If the program has finished with an overlay file permanently, it can speed up searching by setting that program's entry in the array to "".

Example:

```
READ num_overlays%
DIM o_name$(num_overlays%-1)
FORI%=0TOnum_overlays%-1
  READ o_name$(I%)
NEXT
DATA 6
DATA adfs:&.UserLib,
     adfs:%.SystemLib,
     adfs:%.PrintLib,
     adfs:&.TextLib.FontUtils,,
OVERLAY o_name$()
```

Array Initialisation

Syntax: <Array Specifier>=<expression> OR <Array Specifier>=<expression>,<expression>,...

It is now possible to initialise the elements of an array all at once. You can either set them all to the same value or set them to a list of values. When the array is many-dimensional, the last subscript changes with greatest frequency. If the list is shorter than the size of the array then all other elements are ignored.

Example:

```
DIM A%(10),B(2,1)
A%()=7
B()=0,0.63,0.88,1.77,2.33
```

In this example, all the elements of A% become 7, while B ends up as: B(0,0)=0, B(0,1)=0.63, B(1,0)=0.88, B(1,1)=1.77, B(2,0)=2.33.

SUMLEN function

Syntax: SUMLEN(<String Array Specifier>)

This function returns the sum of the lengths of all the strings in a string array.

Example:

```
char_count%=SUMLEN(text_lines$())
```

MOD function

Syntax: MOD(<Numeric Array Specifer>)

This function returns the modulus of a numeric array, which is equal to the square root of the sum of the squares of all the elements in the array.

Example:

```
vel_magnitude=MOD(velocity_
                          vector())
```

ERROR EXT statement

Syntax: ERROR EXT <error number>, <error text>

This statement returns the error given to the calling program.

Example:

```
ERROR EXT 1,"Unable to run - Out
    of memory"
```

QUIT function

Syntax: QUIT

This function returns TRUE if Basic was called with -quit on the command line.

Example:

```
finish_off%=QUIT
IF finish_off% THEN
    PRINT"Returning to RISC-OS"
END
```

LOCAL DATA, RESTORE DATA

This statement saves the current data pointer on the stack in the same way that LOCAL ERROR saves the error routine pointer. The RESTORE DATA statement can be used to retrieve the old data pointer. In functions and procedures, if the LOCAL DATA is the last LOCAL item then it will automatically be restored at the end of the procedure. Note that these statements can be used outside procedures as well as inside them.

Example:

```
DEFPROCage_boundaries(array%())
LOCAL DATA
RESTORE +0
DATA 5,18,25,39,49,55,65,80,100
FOR I%=0TO8
  READ array%(I%)
NEXT
ENDPROC
```

This procedure gets the numbers in the data statement into the array specified without corrupting the main program's data pointer.

END= statement

This statement provides a simple way of implementing programs which only use the amount of system memory they need. END=<address> changes the Wimp slot-size associated with the currently running program. This is an advanced feature that should be used with care.

Example:

```
END=PAGE+&3000
```

Assembler Enhancement

The assembler can now check whether it has reached the end of the memory that has been allocated for code. If bit 3 of OPT is set then L% should hold the end of the memory allocated to the assembler. When this is reached the assembler will stop with error 2, Assembler Limit Reached.

Example:

```
code_size%=&800
DIM code% code_size%
L%=code%+code_size%
...
FOR pass%=8TO11STEP3
P%=code%
[OPT pass%
...
```

Extra Routines exported by CALL

The BASIC interpreter now provides further routines for applications programs to use. The table has been extended so that, after TOKENADDR, there is a 0 word, followed by a number indicating the number of further routines present. On RISC-OS 2.0 this number is 9. On older versions it will be 0 or negative. The table then is:

```
...
B TOKENADDR       B FSUB
EQUD 0            B FMUL
EQUD 9            B FDIV
B FSTA            B FLOAT
B FLDA            B FIX
B FADD            B FSQRT
```

Each of these is a branch to a routine. The routines are as follows:

FSTA: Store the 4 word floating point number in r0–r3 in its 5–byte form in the memory pointed to by r9. r2 is corrupted. No possible error.

FLDA: Load the 5 byte floating point number pointed to by r9 into its 4 word form in r0–r3. No possible error.

FADD: Add 4 word form in r0–r3 to 5 byte form pointed to by r9. Result in r0–r3. Uses r4–r7. Overflow error possible.

FSUB: Subtract 4 word form in r0–r3 from 5 byte form pointed to by r9. Result n r0–r3. Uses r4–r7. Overflow error possible.

FMUL: Multiply 4 word form in r0–r3 by 5 byte form pointed to by r9. Result in r0–r3. Uses r4–r7. Overflow error possible.

FADD: Divide 5 byte form pointed to by r9 by 4 word form in r0–r3. Result in r0–r3. Uses r4–r7. Overflow, Divide by 0 errors possible.

FLOAT: Convert an integer in r0 to a 4 word floating point value in r0–r3. Type field of r9 set to &80000000 (floating).

FIX: Convert floating point value in r0–r3 to integer in r0. Type field of r9 set to &40000000 (integer). Overflow error possible.

FSQRT: Take square root of floating point value in r0–r3. Result in r0–r3. Uses r4–r7. A

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Studio 24 Plus

Andy Harding

From its launch, the Archimedes was acclaimed as being ideal for making music. Not only do the internal sound generation facilities surpass anything possible with the immediate competition, but the sheer speed of the machine makes it an excellent controller for external musical instruments. EMR exploited the first of these with their Soundsynth and the associated Creations disks, sounds from which can be used with applications such as the Maestro music editor. The second part of their 'Arpeggio' series is Studio 24 Plus, focusing more towards the outside world of MIDI.

So what is MIDI?

MIDI stands for 'Musical Instrument Digital Interface' and has proved to be a very successful and popular standard by which instruments can be connected to each other and to computers. Keyboards, drum machines and even 'wind controllers' from a wide range of manufacturers now come ready to transmit and receive MIDI data. Even the Atari ST is supplied fitted with MIDI IN and OUT ports – a factor which has made it the industry standard MIDI controller, used by many professional musicians on stage and in recording studios.

Where does Studio 24 Plus fit in?

Studio 24 Plus is what is known as a MIDI sequencer or recording system. It acts rather like a 24 channel multi-track tape machine, except that instead of recording analogue waveforms or digital samples of sounds it works with MIDI data. This includes information such as the pitch and velocity of a note as it is struck (NOTE ON), when it finishes (NOTE OFF), and the behaviour of other controls like 'pitch bend'. As with a tape machine, tracks can be recorded one at a time, while listening in sync to what has already been 'laid down'. Small sections can be re-recorded by 'dropping in', individual tracks can be heard on their own, muted or copied in whole or part onto other tracks. The advantage of a sequencer lies in the extra flexibility it provides – sections of a track can be time-shifted, or 'quantised' to tidy up the rhythm, while the pitch and volume of individual notes can be edited to correct mistakes.

What this amounts to is that Studio 24 Plus is not really a stand-alone piece of software. While it is possible to use the Arc's keyboard 'mapped' as a piano and driving the internal sound system, the full power can only be realised when using one or more external MIDI instruments. This means that you will also need a MIDI interface, a number of which are available from Acorn or EMR. Note, however, that Acorn's MIDI add-on to the I/O podule is NOT suitable as it is not fast enough. I use the Acorn

single width podule, costing around £80, along with a Yamaha DX11 Synthesizer. This cost around £600, but simple MIDI-keyboards can be obtained from about £150. This combination also works with the !Maestro music editor that comes with RISC-OS, but for playback only – the notes are still entered as a score.

What do you get?

The package consists of a single protected disk and a 70-odd page 'introductory' manual in an A5 binder. In the version I have there is no mention of RISC-OS, nor is there an EMR entry on the RISC-OS Support Disk. However, the disk autoboots OK with RISC-OS, but frustratingly there is no way to install the program onto a hard disk – the floppy must be used every time.

On starting the program, you are asked how much space to reserve for the WFS – EMR's Waveform Filing System. This is the link to SoundSynth, allowing its waveforms or samples to be used by Studio 24 Plus. However, even with the headphones output of the Arc feeding my external amplifier, I found the the sound quality of the internal voices couldn't approach those of the DX11, mainly because of the computer noise on the sound output and the fact that the Arc's sound system has a resolution of only 8-bits (for comparison, the BBC's FM transmitter feeds are 13-bit while Compact Disk is 16-bit).

The next part of the loading process is the impressive digitised title page – a picture of a keyboard and a musical score. This is eventually replaced by the main control panel. At first sight this looks cluttered and overcrowded – there must be somewhere over 200 'clickable' areas on the screen. However, I was soon convinced that it is the only way to work with such a package. All the controls and their statuses are immediately available, without having to grope through a nest of menus.

The Screen Display

The screen is divided into major areas, grouping functions together. At the top is a menu bar, providing options such as FILES for loading and saving, EDIT for editing the MIDI events in minute detail, SCORE and VIDEO. The last two don't do an awful lot in version 1.0, unless you have extra software and hardware in the form of EMR's Scorewriter package and a Watford digitizer. I suspect these are really there as a taste of things to come in future releases.

Moving down the screen, there is a graphic area which can show either bargraph meters of activity on all 24 channels or an amazing real-time 9 octave keyboard display on which the keys are highlighted as they play. Under this are the track controls, which can be used to select tracks for record, solo, mute or off, and to assign MIDI channels and/or internal voices. Other areas are the location windows, showing the current position in the music, the Control Desk or 'transport' icons such as RECORD, PLAY, FF and REW and a simple help window. This still only covers about half of the items on the screen, as there are a host of other controls selecting things like the Metronome, tempo, quantisation, cut/paste and MIDI filters etc.

Using the system

In use, the system is a delight, being both natural from a musical point of view and logical in operation. Above all, the speed at which everything happens makes the competition on other machines look sluggish (I've just read that producers of two MIDI packages on the Atari have now re-written GEM-DOS in order to try and improve the speed performance!). The program really does make it feel like using a multi-track tape machine – but without having to wait for the tape to keep rewinding between overdubs.

I spent my first weekend with the package recording the first movement of Bach's fifth Brandenburg Concerto – playing each of the parts one at a time and at a very slow tempo. Each time my playing 'fell apart' I stopped, went back a couple of bars, and then carried on again. After each section, I went through correcting any mistakes using EDIT mode, and for the fast passages I used the 'single-step' facility, for which you set the note length and then play the notes or chords one at a time. On playback they come out precisely in time. The end result is over 10 minutes of music at full speed, using seven voices. I estimate that the same exercise with an 8-track tape machine would have taken me a number of weeks.

Gripes

As with any piece of software, there are some flaws, which may of course be due to my personal preferences. One is that the 'quantise' facility can only act on a whole track, and I found often that I wanted only to tighten up a small section without losing the expression or things like 'triplets' in the rest. The only way to achieve this is to copy the section to an unused track, quantise it there and then copy it back. I felt the EDIT display, in the form of a list of bar:beat:ticks against note name, could be difficult to get to grips with and would have benefited from a more graphical approach – it is often difficult to match up the NOTE ON events with their corresponding NOTE OFFs.

The FILES menu is also a bit of a pain, requiring several clicks to select a file, specify load or save, and then OK before EXITing back to the main screen. While loading and saving data with a hard disk is possible, the writers seem to have forgotten that the Archimedes can also have external floppy drives – I couldn't mount the hard drive without having a disk in my external 5.25 drive or changing the CMOS configuration, as the drive selection cycles though all those configured in sequence!

Testing the Limits

With only a single MIDI instrument, I couldn't really stretch the system to the limit. Since MIDI is a serial interface, multiple instruments are normally chained together so the greater the amount of data that has to be carried the slower it can get. However, EMR have catered for this by providing a 4-way MIDI podule (£129), and allowing the port to be assigned along with the channel. If you are intending using a large number of instruments then this is probably the way to go.

Finale

To conclude, I would heartily recommend the package for the home-user, semi-professional musician or for schools, but be aware that it can get expensive by the time you've bought an instrument and interface. For professional users, the advanced features of V2.0 (announced but not yet released) such as timecode synchronisation will really be needed, and other goodies such as the promised real-time score display would be of great use for spotting mistakes.

As for me, I'd love the Score-writer facility, but at £500 plus a Laserwriter...? A

Risc User Volume №1 Special Disc

Richard Forster

As you probably already know, the BBC user group Beebug produce a magazine called Risc User. How it compares to this magazine is not the question, but they have done some pretty impressive programs. Six of the best can be found on this disc.

On the disc there are five utilities and one pleasant demo program. Three of the five utilities are also supplied in module form which gives them the added advantage that they need only be loaded once, to be used several times. Getting the disc to run is simplicity itself. You just need to configure 8k of sprite memory and then boot the disc.

The source code for the three modules is provided on the disc. This allows easy modifications to be made. This is especially useful in the case of the Toolkit program because additions have been published in volume 2 of Risc User. I am unsure of RISC-OS compatibility, but I am aware that one command, relating to disc editing, will not work on E-format discs.

Rotating World

'Oh no! Not another rotating globe!', I hear you cry. Well, yes, it is and no, it is not. It is as the title suggest a rotating earth, but I have not seen it done before in this way . . . except for BBC 1 television's logo. It is pretty impressive, although it is not as good as some of the other rotating world demos. It only uses up 370k of memory though, and many of the more complex ones, use up the machine's full quota with sprites.

Risc User Disc Menu

This is in the form of a module and, once it has been loaded, *M or *MENU will activate it. The menu is totally mouse-controlled and has some nice features. For example, the time is constantly displayed upon the screen.

The screen is split into several parts. At the top there are control 'buttons'. These buttons cover all the features like copying, renaming etc. Below this comes information about the disc and its catalogue. At the bottom, it displays details of the file that the mouse pointer is currently indicating.

The program is useful and works well. My only quibble with it is that the screen display is not exactly what you would call pleasing to the eye. Basically, the features are as on the desktop, but with a few added extras. For example, you can set the filetypes of all selected files.

Full Screen Pixel Editor

The full screen pixel editor does exactly what the title suggests. However, the utility gobbles up memory, needing dual screens and lots of sprite memory. Once you have gone though the laborious process of configuring your machine, you are left with a very powerful screen editor for mode 13 and mode 15 screens.

Facilities are provided for grabbing areas of the screen. Once these areas have been grabbed, various degrees of manipulation can be performed on them. The size of the area you can grab, depends on how much sprite memory you have configured and the options for manipulation are chosen via the function keys. An explanation of the keys is given on the main menu, which you can always get to by pressing <escape>

Extended Printer Buffer

This module contains two star commands, for extending your printer buffer. I found it extremely easy to use and especially useful for printing out long listings while getting on with a more important job. Accidental clearing of the buffer is prevented, and you have to press <alt-escape> to clear it. The source code for it is readily available, so it should not be too hard to adapt.

Risc User Toolkit

This toolkit provides all those useful commands which Acorn decided to leave out. It has many of the utilities which you used to find on the toolkit roms which were so abundant for the BBC. It offers some very nice options, especially if you don't have Clare's Toolkit.

The commands are exactly what you would expect to find. There are several commands for editing memory, editing discs and searching for specific bytes or sequences of bytes. Both the editing devices have a similar 'appearance' and the keys for both are identical. Some nice features are offered – for example, you can start editing a disc from the start of a file as well as from a certain sector.

ArcScan

I have definitely left the best till last. For those of you who do not know, ArcScan is a very fast magazine catalogue program. It allows you to search rapidly through computerized indexes of Risc User and Beebug.

Using the program is easy to use. You simply type in one or two keywords and in the twinkling of an eye any articles/reviews/news, etc. whose titles or descriptions contain those keywords are displayed, along with details on where they can be found (to the page). Logical operands can be used (OR or AND) and both wildcards (# and *) are available.

With the exception of inputing text, control is totally by the mouse. The search routine achieves its speed by being written in ARM code. This gives it a rate of 130k worth of data in around half a second. Beebug have definitely made good use of the Archimedes speed.

A help facility is constantly available by clicking on the help icon. This displays several pages worth of information, covering ever option available even down to suggested spellings of certain words. Indexes are supplied for volume 1 of Risc user, and all of Beebug, up to vol.7 no.4. No facility is provided for generating your own data, but one is provided for installing the monthly catalogue on Risc User's disc.

The disc sells for £12.50 to Beebug / Risc User members, or £13.16 to non members. There is an added £1 p&p. (or £12 when purchased through Archive magazine.) A

N.B. If you want ArcScan data files for Risc User up to Vol. 2.4 and Archive Volume 1 and 2 up to 2.9, then these are available on Shareware Nº 7.

Mike Harrison's Bits & Pieces...

Mike Harrison

Problems with I/O Podules & hard disks

(As mentioned in the Computerware review last month) The problem is with the I/O podule, not the disk controller. Early versions of the I/O podule ROM (pre version 2) did not disable interrupts from the A to D converter on a Break (as opposed to RESET, which asserts the reset line on the podule bus.) The problem occurs when a podule (e.g. Hard Disk controller) enables IRQ interrupts from the backplane before the I/O podule software is initialised. The IRQ line is jammed low and the machine locks up. There are three possible solutions (1) Get a new ROM from Acorn, (2) If you don't use the A/D port, remove the A/D IRQ link on the I/O podule, or (3) Put the I/O podule in slot 0. (This might cause cable routing problems from the hard disk)

Current projects...

The Watford 300 series 4 megabyte board – at long last I've finally got the RAMs and got this working. Watford are still sorting out the PLCC connectors, but hopefully this shouldn't take more than a few weeks. The (4 layer) board will be software switchable down to 1 megabyte (e.g. to check that programs run on a 1 meg machine). Price will obviously depend on current RAM prices.

I've just done the PCB for a 3 meg RAM board for A3000s for Watford, which will probably also be supplied as a 1 meg version, upgradeable simply by plugging in chips and changing a link. I hope to have a prototype at the A.U. Show.

SCSI interface (for Oak computers) to allow the use of BIG, fast hard disks – up to 4 drives of up to 512MB each. Speed is very good – over 1 megabyte per second with some drives, (The Acorn controller is 300 to 400K per second). In high video DMA modes (e.g. 21), SCSI is up to 25 times faster than the Acorn controller, which nosedives to 16 K per second! SCSI simply appears as another filing system (SCSI-FS), with its own disk filer icon on the desktop. The podule will be available in a few weeks. Software to use tape streamers with the SCSI card is also planned.

Also for Oak, I've done a RISC-OS desktop utility for plotting Draw files on an HPGL compatible plotter. This isn't a full-blown RISC-OS print driver, but it works well, and makes Draw a viable (not to mention cheaper and faster) alternative to AutoSketch, especially for detailed diagrams. When it's finished, it will probably run in the background, and include some optimisation to reduce pen-up plotter movements.

A3000

I got hold of an A3000 last week and have done some investigation to explore the expansion connecters and a few other things.

External Expansion

The rear connector acts as podule 0, the only difference being that only the +5V supply is present, so podules needing +12v or –5v won't work. I think the full 1 amp (as specified in the podule spec.) is available, although the PSU may run warmer (I managed to get 4 amps without loss of regulation, but this would probably fry the PSU if done for long periods!). All the 5V only podules I've tried (SCSI, hard disk, digitiser) work OK.

The big shock (no, Paul, I didn't touch the heatsink!) was that the external podule connector does **not** have the extra signals (LA21 and S4) required to add more than one external podule via a backplane. I can only assume that this is a deliberate move by Acorn to limit expansion – I can't see that they would make this big a mistake unintentionally. Suppliers wishing to make podule expansion boxes will have to modify the A3000 to bring the signals out to 2 of the spare pins normally used by co-processors. Fortunately, this can be done by soldering 2 wires on the component side of the board and it would be a good idea if suppliers could standardise on the pins used and establish it as a 'de facto' standard mod, to avoid interchangeability problems – maybe if enough people shout, Acorn could be persuaded to change the board.

So, I propose that pins c7 and c8 be standardised for use as LA21 (**not** master MEMC podule select) and S4 (**not** master podule select). To modify an A3000 to this standard, solder a wire from pin 1 of IC33 to pin c7 of the connector (the seventh from the right on the top row, viewed when the podule socket is pointing away from you, i.e. from the front of the

machine), and another from pin 15 of IC33 to pin c8. With a modified machine and a suitable backplane (with power supply), up to 4 podules could be fitted (3 if the internal one is fitted).

It is interesting to note that pin 18 (the one remaining 'reserved' pin on the co-processor podule connector) is now connected to the IOC S7 peripheral select line, which was unused on A300/400 machines (I wouldn't be surprised to find that this is also the case on the new 400 machines). This opens up possibilities for more podules, although the OS doesn't appear to access this line when starting up, so extra software will probably be needed. *(PRES are doing an interface that will allow connection to four mini-podules to the one standard podule connector. They have done it by software switching rather than modifying the A3000 boards. Ed.)*

Internal expansion

The internal podule expansion connectors carry an 8 bit subset of the standard podule bus, and the internal expansion appears as podule number one. (I have the pinouts if anyone is interested.) The space for internal podule boards is limited to about 2.5 x 7 inches maximum, because of the positioning of the power connectors and the Econet board.

Serial Port

The serial upgrade is done by plugging in 2 chips – the serial controller and a line driver. As the machine has no –5 volt supply, the line driver generates its own negative supply. I've not yet discovered which chip is actually used, although the number and configuration of the external capacitors is identical to that of some similar chips by Linear Technology Inc., although none of the ones I know of have the same number of pins (24) as the one in the A3000. The serial chip is the 65C51 as used in the old machines but the manufacturer may be important – chips from different makers have different bugs (remember the serial fix module?!), and it isn't clear how many of these are catered for in RISC-OS – the GTE and CMD ones certainly are but others may not be. The CMD version is said to be bug free, so use this one if you can get it.

Disk drive

Some people have noticed that the drive on the new 400's has a cut in the cable, and the A3000 also has this. The reason for this is that the new drives don't support the disk changed/eject signals. This may sound an obscure point but it does have noticeable effects, as it is not now possible for ADFS to detect when a disc has been changed, other than by actually accessing the disk. The net effect is that if you have a NoDir state (usually by configuration), the disk is accessed every time you (for example) do a catalogue, whereas the old drives told ADFS if the disk had changed and so the catalogue was read from memory if it hadn't. The upshot is that a NoDir configuration setting will have a much more noticeable (slowing) effect on certain types of disk access.

Oddments

Some reviewers have commented about the exposed power supply. This is only so for the pre-production machines. The production machines have a stiff card cover, which although not totally enclosed, does prevent accidental contact with the nasty bits.

There are a few changes to the video circuitry – protection diodes are fitted on the video outputs to protect VIDC against transients when plugging monitors in (this has been known to kill VIDC chips in the old machines). This is especially important as VIDC (as well as IOC, MEMC and ARM) is soldered into the board.

There are more links to configure the sync signals to suit non-standard monitors. The most useful settings are, for *Configure sync's 1 and 0:

	LK24	LK25	sync pin 4	sync pin 5
1	South	Absent	–ve composite *(Fit LK27 for +ve)*	high (default)
0	North	Fitted	+ve line sync *(fit LK26 for –ve)*	+ve frame sync *(fit LK27 for –ve)*

The latter setting is needed for some Multisync monitors. A

That's it folks. Articles that I didn't manage to fit in include: "RISC-OS Multi-sync Graphics" and reviews of Arcendium, Techsoft Intro, Jet Fighter, Eucorn, Noah Paint Professional and Shareware Nº9. Ed.

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